# NUMBERS

## DRILL – 1 – TO FIND THE NUMBER OF FACTORS

**Steps**:   Express the number as $N = a^p \times b^q \times c^r$

No. of factors = $(p+1)(q+1)(r+1)$

Sum of the factors = $[a^{p+1} – 1 / a – 1 ] [b^{q+1} – 1 / b – 1 ] [ c^{r+1} – 1 / c – 1]$

Product of the factors = $N^{(p+1)(q+1)(r+1)/2}$ (Including 1 & itself)

Cross check for the number 15.

Now complete the following table:

| Number | No. Of Factors | Sum of divisors | Product of divisors |
|--------|----------------|-----------------|---------------------|
| 60 | | | |
| 36 x 36 | | | |
| 126 x 440 | | | |
| 52900 | | | |

## DRILL 2 – TO FIND THE NUMBER OF ENDING ZEROES

The number of zeroes at the end of any product is the number of actual 2's or 5's whichever is less. In the case of n!, the number of ending zeroes is $n/5 + n/5^2 + n/5^3 + \dots n/5^n$ where $n >= 5^n$

| Numbers | Zeroes | Numbers | Zeroes |
|---------|--------|---------|--------|
| 25! | | 100! | |
| 50! | | 200! | |
| 25! + 50! | | 100! + 200! | |
| 25! x 50! | | 100! x 200! | |
| | | | |
| 136! | | 252! | |
| 140! | | 244! | |
| 136! + 140! | | 252! + 244! | |
| 136! x 140! | | 252! x 244! | |

**DRILL 3 – TO FIND THE LAST DIGIT**

Let the number be $(xyz)^n$
Divide n by 4 and check the table to find the last digit. Also complete the next table based on the same strategy.

| Remainder | Last digit |
|---|---|
| 0, z is even | 6 |
| 0, z is odd except 5 | 1 |
| 1 | Z |
| 2 | $Z^2$ |
| 3 | $Z^3$ |

| Expression | Last Digit | Expression | Last Digit |
|---|---|---|---|
| $2^9$ | | $15743^{577}$ | |
| $12^4$ | | $6525^{899}$ | |
| $336^{21}$ | | $(ab......2)^{4n+1}$ | |
| $(ab......3)^{4n+3}$ | | $45^{25} \times 36^{45}$ | |
| $99^{11} \times 11^{99} \times 34^{43}$ | | $100^{21} \times 21^{103}$ | |

**DRILL 4 – TO FIND THE REMAINDER**

- $X^n + 1$ will always be divisible by $X + 1$ only when n is odd.
- $X^n - 1$ will always be divisible by $X + 1$ only when n is even.
- $x^n - a^n$ is always divisible by $x - a$ for all values of n.
- $x^n - a^n$ is always divisible by $x + a$ for even values of n.
- $x^n + a^n$ is always divisible by $x + a$ for odd values of n.
- $x^n + a^n$ is not divisible by $x - a$ for any value of n.
- For any value of n, if any number $(kx + 1)^n$ divided by x will leave a remainder $1^n$
- When p is a prime number and N is any natural number not divisible by p, then $N^{p-1}$ if divided by p will leave a remainder 1.

➢ What will be the remainder when $(67^{67} + 67)$ is divided by 68?
  a. 1                b. 63                c. 66                d. 67

➢ Which one of the following is the common factor of $(47^{43} + 43^{43})$ and $(47^{47} + 43^{47})$?
  a. (47 – 43)        b. (47 + 43)        c. $(47^{43} + 43^{43})$        d. NOT

➢ Which of the following numbers will completely divide $(49^{15} - 1)$?
  a. 8                b. 14                c. 46                d. 50

> What will be remainder when $17^{200}$ is divided by 18?
>   a. 17                 b. 16                 c. 1                 d. 2

> Find the remainder when $33^9$ is divisible by 7.
>   a. 8                 b. 4                 c. 6                 d. 5

> Find the remainder if $16^{1683}$ is divided by 83.
>   a. 1                 b. 3                 c. 6                 d. 7

## DRILL 5 - TO FIND THE REMAINDER

X ÷ D = R1 (Remainder)
X ÷ d =? (Remainder – R2), where d is a factor of D.
Then the required remainder R2 is the remainder when the larger remainder R1 is divided by smaller divisor'd'.

> On dividing a number by 56, we get 29 as remainder. On dividing the same number by 8, what will be the remainder?
>   a. 4                 b. 5                 c. 6                 d. 7

> On dividing a number by 357, we get 39 as remainder. On dividing the same number by 17, what will be the remainder?
>   a. 0                 b. 3                 c. 5                 d. 11

> On dividing a number by 527, we get 42 as remainder. On dividing the same number by 17, what will be the remainder?
>   a. 4                 b. 6                 c. 8                 d. 14

## DRILL 6 – ALGEBRAIC FORMULAE

- $(a + b)^2 = a^2 + b^2 + 2ab$
- $(a – b)^2 = a^2 + b^2 – 2ab$
- $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
- $(a + b)^3 = a^3 + b^3 + 3a^2b + 3 ab^2 = a^3 + b^3 + 3ab(a+b)$
- $(a - b)^3 = a^3 - b^3 - 3a^2b + 3 ab^2 = a^3 - b^3 - 3ab(a-b)$
- $(a^2 – b^2) = (a + b)(a – b)$
- $(a^3 - b^3) = (a – b)( a^2 + b^2 + ab)$
- $(a^3 + b^3) = (a + b)( a^2 + b^2 - ab)$
- $(a + b + c)(a^2 + b^2 + c^2 – ab – bc – ca) = a^3 + b^3 + c^3 – 3abc$

> [(753 x 753) + (247 x 247) – (753 x 247)] / [(753 x 753 x 753) + (247 x 247 x 247)]
>   a. 1 / 1000          b. 1/506          c. 253 / 500          d. NOTA

> $(963 + 476)^2 + (963 - 476)^2$ / 963 x 963 + 476 x 476
>   a. 1449          b. 497          c. 2          d. 4

> $(489 + 375)^2 – (489 - 375)^2$ / 489 x 375
>   a. 144          b. 864          c. 2          d. 4

> (397 x 397) + (104 x 104) + 2 x 397 x 104
>   a. 250001          b. 251001          c. 260101          d. 261001

> (768 x 768 x 768) + (232 x 232 x 232) / (768 x 768) – (768 x 232) + (232 x 232)
>   a. 1000          b. 536          c. 500          d. 268

> (854 x 854 x 854) – (276 x 276 x 276) / (854 x 854) + ( 854 x 276) + (276 x 276)
>   a. 1130          b. 578          c. 565          d. 1156

## DRILL 7 – DIVISIBILITY TEST

> If the number 517a324 is divisible by 3, then the smallest whole number to replace 'a' is
>   a. 0          b. 1          c. 2          d. NOTA

> Which of the following number is divisible by 24?
>   a. 35718          b. 63810          c. 537804          d. 3125736

> If the product 4862 x 9P2 is divisible by 12, then the value of P is
>   a. 1          b. 5          c. 6          d. 8

> 476ab0 is divisible by both 3 and 11. The non zero values of a & b are
>   a. 7 & 4          b. 7 & 5          c. 8 & 5          d. NOTA

> If the number  42573x is divisible by 72, then the least value of x is
>   a. 4          b. 5          c. 6          d. 7

## DRILL 8 - PROGRESSIONS

Arithmetic Progression
$t_n = a + (n – 1)d$
$S_n = n[2a + (n – 1)d] / 2$
where 'a' is the first term, 'd' is the common difference, $t_n$ is the nth term and $S_n$ is the sum
of n terms.

Geometric Progression

$t_n = a \, r^{(n-1)}$

$S_n = a(r^n - 1) / r - 1$

where 'a' is the first term, 'd' is the common ratio, $t_n$ is the nth term and $S_n$ is the sum of n terms.

Also

> Sum of first n natural numbers = *n(n+1)/2*
>
> Sum of the squares of first n natural numbers = *n(n+1)(2n+1)/6*
>
> Sum of the cubes of first n natural numbers = *[n²(n + 1)²] / 4*
>
> Sum of first n natural odd numbers = *n²*

➤ Find the 10th term of the A. P.: 2, 4, 6, ...

   (a) 16            (b) 18            (c) 20            (d) 24

➤ The 10th term of an A. P. is – 15 and 31st term is –57, find the 15th term.

   (a) -25           (b) -30           (c) -34           (d) -38

➤ Is 600 a term of the A. P.: 2, 9, 16, ...?

   (a) Yes          (b) No           (c) Data Insufficient    (d) CBD

➤ Which term of the A. P. 2 ½, 4, 5 ½, , , , ..... is 31? Find also the 10th term?

   (a) 10th term & 31    (b) 20th term & 16    (c) 15th term & 12       (d) NOTA

➤ The 35th term of an A. P. is 69. Find the sum of its 69 terms.

   (a) 4204         (b) 4486         (c) 4761         (d) CBD

➤ Find the 6th term of the G. P.: 4, 8, 16, ...

   (a) 48            (b) 64            (c) 80            (d) 128

➤ The 1st and the 9th term of a G. P. are 1 and 256 respectively. Find the G. P.

   (a) 1, 2, 4, 8, 16    (b) 1, 4, 16, 32, 64    (c) 1, 2, 4, 16, 32    (d) 2, 4, 8, 16, 32

➤ Which term of the G. P.: 5, –10, 20, – 40, .... is 320?

   (a) 6th term       (b) 7th term       (c) 8th term       (d) 9th term

**DRILL 9 – HCF & LCM**

Important formulae:

For any 2 numbers A and B, $(HCF)_{A,B} \times (LCM)_{A,B} = A \times B$

LCM of fractions = LCM of numerators / HCF of Denominators
HCF of fractions = HCF of numerators / LCM of Denominators

Complete the table:

| A | B | HCF (A,B) | LCM (A,B) |
|---|---|-----------|-----------|
| 12 | 9 | | |
| 34 | 50 | | |
| 25 | | 5 | 200 |
| | 60 | 6 | 1260 |
| 7 | | 1 | 35 |
| ¾ | ½ | | |
| 4/7 | 5/7 | | |
| 1/3 | 1/6 | | |
| 5/7 | 7/5 | | |

**DRILL 10 – HCF & LCM – RAPID INFORMATION LIST**

| S.No | *Type of Problem* | *Approach to Problem* |
|------|-------------------|------------------------|
| 1 | Find the **greatest number** that will exactly divide x, y and z. | Required number = HCF of x, y and z |
| 2 | Find the **greatest number** that will divide x, y and z leaving remainders a, b and c respectively | Required number = HCF of (x – a), (y – b) and (z – c) |
| 3 | Find the **least number** that is exactly divisible by x, y and z. | Required number = LCM of x, y and z |
| 4 | Find the **least number** which when divided by x, y and z leaves remainder a, b and c respectively. | Then it is observed that x – a = y – b = z – c = k <br> Required number = (LCM of x, y, z) – k |
| 5 | Find the **least number** which when divided by x, y and z leaves the same remainder 'r' | Required number = (LCM of x, y, z) + r |

| | | |
|---|---|---|
| 6 | Find the **greatest number** that will divide x, y and z leaving same remainder in each case | Required number = HCF of (x - y), (y – z) and (z – x) |

**Find the following:**

➢ The greatest number that will exactly divide 200 and 320 

➢ The greatest number that will divide 148, 246 and 623 leaving remainders 4, 6 and 11 respectively 

➢ The least number which when divided by 27, 35, 45 and 49 leaves remainder 6 in each case 

**Drill – 11 – BASE OF A NUMBER**

| BASE SYSTEM | BASE | NUMERS USED | NO.OF DIGITS USED |
|---|---|---|---|
| DECIMAL SYSTEM | 10 | 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 | 10 |
| OCTAL SYSTEM | 8 | 0, 1, 2, 3, 4, 5, 6, 7 | 8 |
| BINARY SYSTEM | 2 | 0, 1 | 2 |
| IN GENERAL, A NUMBER SYSTEM WITH BASE, B | 0 TO B-1 | | B |

Convert the given numbers to their equivalents in other bases across the rows:

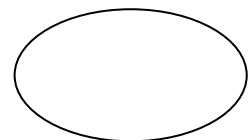| Base 2 | Base 5 | Base 8 | Base 10 |
|---|---|---|---|
| | | | 39 |
| 110101 | | | |
| | | 74 | |

**GOOGLY QUESTIONS**

1. How many positive integers less than 300 are divisible by both 9 and 4?
   Solution:
   Numbers less than 300 divisible by 9 = 33
   Numbers less than 300 divisible by 4 = 75
   Numbers less than 300 divisible by both 9 and 4 = 75 + 33 = 108
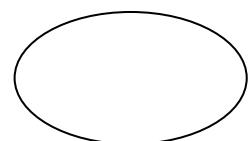
2. Find the number of zeroes at the end of 250! + 300!
   Solution:
   Number of zeroes at the end of 250! = 62
   Number of zeroes at the end of 300! = 74
   Number of zeroes at the end of 250! + 300! = 62 + 74 = 136

**PRACTICE PROBLEMS**

1. Find the number of factors for 363 x 512.
   a. 60                  b. 120                 c. 30                  d. 36

2. Find the sum of factors for 72
   a. 165                 b. 175                 c. 185                 d. 195

3. $(112 \times 5^4) = ?$
   a. 67000               b. 70000               c. 76500               d. 77200

4. It is being given that $(2^{32} + 1)$ is completely divisible by a whole number. Which of the following numbers is completely divisible by this number?
   a. $(2^{16} + 1)$      b. $(2^{16} - 1)$      c. $(7 \times 2^{23})$      d. $(2^{96} + 1)$

5. What least number must be added to 1056, so that the sum is completely divisible by 23?
   a. 2                   b. 3                   c. 18                 d. 21

6. The largest 4 digit number exactly divisible by 88 is :
   a. 9768                b. 9944                c. 9988                d. 8888

7. Find the units digit in $\{(6374)^{1793} \times (625)^{317} \times (341^{491})\}$?
   a. 5                   b. 2                   c. 3                  d. 0

8. On dividing a number by 5, we get 3 as remainder. What will be the remainder when the square of this number is divided by 5?
   a. 0                   b. 1                   c. 2                  d. 4

9. A 3-digit number 4a3 is added to another 3-digit number 984 to give a 4-digit number 13b7, which is divisible by 11. Then, (a + b) = ?
   a. 10                  b. 11                  c. 12                 d. 15

10. If the number 481 * 673 is completely divisible by 9, then the smallest whole number in place of * will be:
    a. 2                  b. 5                   c. 6                  d. 7

11. Mark answer    (A) if quantity in Column A is greater
                   (B) if quantity in Column B is greater
                   (C) if the quantities are equal
                   (D) if the relationship cannot be determined from the information given.

| S.No | Column A | Column B |
|---|---|---|
| 1. | The number of prime factors of 18 | The number of prime factors of $18^3$ |
| 2. | $3^{40}$ | $4^{30}$ |
| 3. | 332/222 | 333/223 |
| 4. | $22^{23}$ | $23^{22}$ |

12. Find the number of zeroes for 112! + 620!

    a. 26              b. 152              c. 178              d. 126

13. Find the number of zeroes for 343! x 699!

    a. 68              b. 139              c. 207              d. NOT

14. In a division sum, the divisor is 10 times the quotient and 5 times the remainder. If the remainder is 46, what is the dividend?

    a. 4236            b. 4306            c. 4336            d. 5336

15. $(11^2 + 12^2 + 13^2 + \ldots + 20^2) = ?$

    a. 385             b. 2485            c. 2870            d. 3255

16. On dividing 2272 as well as 875 by 3-digit number N, we get the same remainder. The sum of the digits of N is:

    a. 10              b. 11              c. 12              d. 13

17. Which of the following numbers will completely divide $(3^{25} + 3^{26} + 3^{27} + 3^{28})$ ?

    a. 11              b. 16              c. 25              d. 30

18. Find the greatest number that will divide 43, 91 and 183 so as to leave the same remainder in each case.

    a. 4               b. 7               c. 9               d. 13

19. The H.C.F. of two numbers is 23 and the other two factors of their L.C.M. are 13 and 14. The larger of the two numbers is:

    a. 276             b. 299             c. 322             d. 345

20. Six bells commence tolling together and toll at intervals of 2, 4, 6, 8 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together?

    a. 4               b. 10              c. 15              d. 16

21. The product of two numbers is 4107. If the H.C.F. of these numbers is 37, then the greater number is:

    a. 101             b. 107             c. 111             d. 185

22. The least multiple of 7, which leaves a remainder of 4, when divided by 6, 9, 15 and 18 is:
    a. 74                    b. 94                    c. 184                    d. 364

23. The ratio of the factorial of a number x to the square of the factorial of another number, which when increased by 50% gives the required number, is 1:504. Find the number x?
    (a) 6                    (b) 5                    (c) 9                    (d) none of these

24. Find the least number, which must be subtracted from 7147 to make it a perfect square.
    (a) 86                   (b) 89                   (c) 91                   (d) 93

25. If 5625 plants are to be arranged in such a way that there are as many rows as there are plants in a row, the number of rows will be
    (a) 95                   (b) 85                   (c) 65                   (d) none of these

26. Difference between two numbers is 9 and product of two numbers is 14, what is the square of sum of numbers?
    (a) 102                  (b) 136                  (c) 120                  (d) 109

27. In a class, there are 4 rows and 8 columns. When the teacher says 'start', the girl who is sitting in first row and first column will say 1, then the next girl sitting behind her will say 4, the next girl sitting behind that girl will say 7. In this particular order each girl is tells a number and the following girls told 10 and 13 next turn is yours what will you say?
    (a) 15                   (b) 16                   (c) 18                   (d) 17

28. In school there are some bicycles and 4 wheeler wagons. One Tuesday there are 190 wheels in the campus and the total number of bicycles and 4 wheeler wagons are 80. How many bicycles are there?
    (a) 75                   (b) 66                   (c) 65                   (d) 89

29. The difference between two numbers is 4 and their product is 17. Find the sum of their squares?
    (a) 50                   (b) 76                   (c) 58                   (d) 72

30. What is the value of {(3x+8y)/(x-2y)}, if x/2y = 2?
    (a) 20                   (b) 15                   (c) 18                   (d) 10

31. If B = 2 x 4 x 6….98 x 100, then the number of zeroes at the end of B will be:
    (a) 330                  (b) 11                   (c) 101                  (d) 12

32. The number that is nearest to 2160 and exactly divisible by 52 is:
    (a) 2132                 (b) 2148                 (c) 2184                 (d) 2177

33. Which of the following can never be in the ending of a perfect square?
    (a) 6                    (b) 00                   (c) 000                  (d) 1

34. What is the units digit of (4225 x 2542) + (6336 x 36) + (1999 x 991l)?
    (a) 9                  (b) 5                  (c) 7                  (d) 8

35. A number when divided by 11, 13 and 17 leaves remainders of 7, 9 and 3 respectively. Find the smallest such 4-digit number.
    (a) 2427               (b) 2856               (c) 2586               (d) None of these

36. Find the units digit in $5678^{9999}$ x $185^{4821}$.
    (a) 3                  (b) 1                  (c) 7                  (d) 0

37. If N = 24 X 32 X 27 X 36 X k is a perfect square as well as perfect cube, find the total number of factors of the least value of k, given k is a natural number.
    (a) 4                  (b) 12                 (c) 8                  (d) 6

38. 1/3 of a number is 6 more than 1/6 of that number then what is the number?
    (a) 6                  (b) 36                 (c) 9                  (d) 46

39. (1/2) of a number is 3 times more than the (1/6) of the same number?
    (a) 9                  (b) 12                 (c) 16                 (d) 7

40. The sum of squares of two numbers is 98 and their product is 17. Find the difference between two numbers?
    (a) 7                  (b) 7                  (c) 9                  (d) NOTA

41. Find the smallest number which when divided by 5 or 11 leaves a remainder of 4 and is greater than the remainder.
    (a) 53                 (b) 54                 (c) 57                 (d) 59

42. Find the largest three-digit number which when divided by 8 or 12 leaves a remainder of 2 in each case.
    (a) 995                (b) 969                (c) 975                (d) 986

43. Find the smallest number which when divided by 4, 11 or 13 leaves a remainder of 1 and is greater than the remainder?
    (a) 543                (b) 573                (c) 512                (d) 532

44. Find the smallest number which when divided by 9 and 11 leaves remainders of 7 and 9 respectively?
    (a)88                  (b) 97                 (c) 94                 (d) 95

45. Find the largest four-digit number which when divided by 9 and 11 leaves remainders of 7 and 9 respectively.
    (a) 9997               (b) 9994               (c) 9987               (d) 9995

46. Find the smallest six-digit number which leaves a remainder of 10 when divided by 13 and leaves a remainder of 4 when divided by 7.
    (a) 100003          (b) 100004          (c) 100002          (d) 100006

47. Find the smallest number which leaves a remainder of 7 when divided by 11 and leaves a remainder of 12 when divided by 13.
    (a) 31              (b) 33              (c) 51              (d) 71

48. Find the largest number which leaves remainders of 2 and 3 when it divides 89 and 148 respectively.
    (a) 32              (b) 29              (c) 31              (d) 44

49. Find the largest number which divides 444, 804 and 1344 leaving the same remainder in each case.
    (a) 202             (b) 164             (c) 172             (d) 180

50. The least number which should be added to 2497 so that sum is divisible by 5,6,4,3?
    (a) 23              (b) 24              (c) 20              (d) 27

# AVERAGES AND AGES

## DRILL – 1 – AVERAGE OF DIFFERENT GROUPS

- The average weight of 17 girls is 20 kg and that of 23 boys is 22 kg. Find the average weight of the class.

  a. 20.15          b. 21.15          c. 22.25          c. 23.2

- The average age of students in section A of 40 is 10 years and the average age of students in section B of 30 is 12 years. Find the average age of students in both the sections.

  a. 10.75          b. 10.25          c. 10.85          d. NOTA

- The average salary of all the employees of a company is Rs. 12000. While average salary of a Unionized staff is Rs. 8000 and that of the management staff is Rs. 13000. What is the ratio of the number of unionized staff to the number of management staff?
  Let A and B be the number of unionized staff to the number of management staff.

  a. 2:4            b. 4:1            c. 3:1            d. 1:4

- The average weight of a group of 150 students in a class is 60 kg. If the mean of weights of all the 50 male students in the class is 70 kg, then the average weight of 100 girls in the class is:

  a. 55             b. 60             d. 45             d. 50

- The mean of marks secured by 25 students in section A of class X is 47, that of 51 students of section B is 51 and that of 30 students of section C is 53. Find the mean of marks of students of three sections of class X.

  a. 45.6           b. 47.6           c. 48.7           d. 49.8

## DRILL – 2 – ADDITION / REMOVAL OF ITEMS

Average of new items added

$A +/- ( 1 + N/n) x$

Average of items removed

$A +/- ( 1 - N/n) x$

- The average age of 40 students in a class is 15 years. When 10 new students are admitted, the average is increased by 0.2 year. Find the average age of the new sdents.

  a. 15.5           b. 16             c. 16.5           d. NOTA

- The average salary of 15 teachers is Rs. 4500 per month. Three teachers left the school and the average salary of the remaining teachers dropped by Rs. 175. Find the total salary of the teachers who left the school.

  a. 5200           b. 7400           c. 11600          d. 15600

➢ The average weight of 29 students in a class is 48 kg. If the weight of the teacher is included, the average weight rises by 500 g. Find the weight of the teacher.
   a. 62 kg               b. 63 kg               c. 64 kg               d. 65 kg

➢ There are 50 boys in a class. Their average weight is 45 kg. When one boy leaves the class, the average reduces by 100 grams. Find the weight of the boy who left the class.
   a. 45.8 kg             b. 46.8 kg            c. 48.9 kg            d. NOTA

➢ The average age of 25 students of a class is 10 years. When a new student is admitted, the average age becomes 10.1 years. What is the age of the new student?

   a. 12.6                 b. 13.5                c. 14.2               d. NOTA

## DRILL – 3 – REPLACEMENT OF ITEMS

> For N items in a group,
>
> Sum of new items added – Sum of new items removed = +/- Nx

➢ When a man weighing 80 kg is replaced by another man in a group of five persons, the average weight decreases by 3 kg. What is the weight of new man?
   a. 62 kg               b. 63 kg               c. 64 kg               d. 65 kg

➢ The average weight of 15 students in a class is increased by 1.5 kg when one of the students weighing 40 kg is replaced by a new student. Find the weight of the new student.
   a. 62.5 kg            b. 63.5 kg            c. 64.5 kg            d. 65.5 kg

➢ The average temperature on Tuesday, Wednesday and Thursday was 37®C. The average temperature on Wednesday, Thursday and Friday was 38®C. If the temperature on Friday was 39®C, find the temperature on Tuesday.
   a. 35.8                 b. 36                   c. 36.2               d. NOTA

➢ The average weight of 8 person's increases by 2.5 kg when a new person comes in place of one of them weighing 65 kg. What might be the weight of the new person?
   a. 80                  b. 83                  c. 85                d. 87

➢ When a person weighing 68 Kg is replaced by a new person, the average weight of 10 persons increases by 1(1/2) kg. What will be the weight of the new person?
   a. 80                  b. 83                  c. 85                d. 87

**DRILL – 4 – AGES AND AVERAGE**

➢ A family consists of two grandparents, two parents and three grandchildren. The average age of the grandparents is 67 years, that of the parents is 35 years and that of the grandchildren is 6 years. What is the average age of the family?
   a. 30 5/6          b. 31 2/7          c. 31 5/7          d. NOTA

➢ The average age of husband, wife and their child 3 years ago was 27 years and that of wife and the child 5 years ago was 20 years. The present age of the husband is:
   a. 35 years        b. 38 years        c. 39 years        d. 40 years

➢ Five years ago, the average age of P and Q was 15 years. Average age of P, Q and R today is 20 years. How old will R be after 10 years?
   a. 30 years        b. 23 years        c. 30 years        d. 27 years

➢ The average age of a family of five persons is 20 years. If the youngest member is 8 years old, what was the average age of the family at the birth time of the youngest member?
   a. 30 years        b. 23 years        c. 30 years        d. 27 years

➢ The average age of 30 boys in a class is 15 years. One boy, aged 20 years, left the class, but two new boys came in his place whose ages differ by 5 years. If the average age of all the boys now in the class remains 15 years, the age of the younger newcomer is
   a. 12              b. 13              c. 14              d. 15

**DRILL – 5 – AGES AND RATIO**

➢ The ratio between the present ages of M and N is 5: 3 respectively. The ratio between M's age 4 years ago an N's age after 4 years is 1: 1. What is the ratio between M's age after 4 years and N's age 4 years ago?
   a. 1:3             b. 2:3             c. 3:1             d. 3:2

➢ Six years ago Jose was twice as old as Joseph. The ratio of their present age is 9:5 respectively, what is the difference between their present ages?
   a. 20              b. 24              c. 27              d. 25

➢ The present age of Mr. Sanyal is 3 times the age of his son. Six years hence the ratio of their ages will be 5:2 respectively. What is the present age of Mr. Sanyal?
   a. 72 years        b. 60 years        c. 58 years        d. 54 years

➢ Ten years ago, B was ten times as old as C. If the ratio of their present ages is 4:1, what is the B's present age?
   a. 72 years        b. 60 years        c. 58 years        d. 54 years

> The ratio of Kamala's age to Savitha's age is 7:4 and sum of their ages is 44 years. What will be the ratio of Savitha's age to Kamala's after 8 years?
> a. 1:3                  b. 2:3                  c. 3:1                  d. 3:2

> The ratio of the ages of Vina and Jaya at present is 2:3. After four years, the ratio of their ages will be 5:7. What is the present age of Jaya?
> a. 20                  b. 24                  c. 27                  d. 25

## DRILL – 6 – COMPARISON OF AGES

> Meena is thrice as old as Ajay. Geeta will be twice as old as Meena 6 years hence. Six years ago Ajay was 5 years old. What is Geeta's present age?
> a. 72 years            b. 60 years            c. 58 years            d. 54 years

> A's age 6 years back was half of the total of B and C's present ages. If C is 2 years older than B, what is A's age at present?
> a. 20                  b. 24                  c. 27                  d. CBD

> C's mother was four times as old as C 10 years ago. After 10 years she will be twice as old as C. How old is C today?
> a. 20                  b. 24                  c. 27                  d. CBD

> In 10 years, A will be twice as old as B was 10 years ago. If A is now 9 years older than B, then present age of B is
> a. 35 years            b. 38 years            c. 39 years            d. 40 years

> Ayesha's father was 38 years of age when she was born while her mother was 36 years old when her brother four years younger to her was born. What is the difference between the ages of her parents?
> a. 2 years             b. 4 years             c. 5 years             d. 6 years
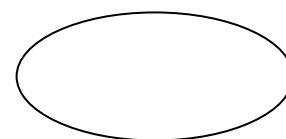
## GOOGLY QUESTIONS

1. The average cost of 10 apples and 12 oranges is Rs.32 and 14 apples and 12 oranges is Rs.48. find the cost of 24 apples and 24 oranges.
   **Solution :**
   10A + 12O = 32
   14A + 12O = 48
   24A + 24O = 32 + 48 = 80

2.  A person was asked to state his age in yrs. His reply was "Take my age 3 yrs hence, multiply it by 3 and then subtract 3 times my age 3 yrs ago and you will know how old I am". What is the age of the person
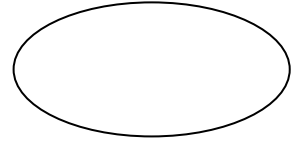    **Solution:**
    A = present age
    3a x 3 = 9a
    9a – 3(a-3) = 9a – 3a + 9 = a
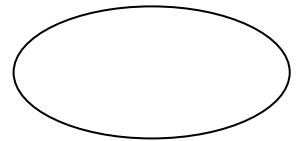    5a = 9
    Therefore, cannot be determined

3.  The average age of 25 students of a class is 10 years. When a new student is admitted, the average age becomes 10.1 years. What is the age of the new student?
    **Solution:**
    For 26 students it increases by 0.1. Therefore from 10 years it should be Increased by 2.6(0.1 x 26).
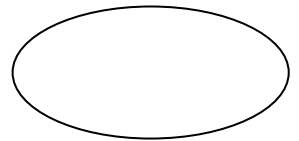    Hence the age of the new student is 10 + 2.6 = 12.6 years

4.  The present ages of 3 persons are in the proportions 4:7:9. 8 yrs ago, the sum of their ages was 56. Find their present ages.
    **Solution:**
    Let the present ages of three persons be 4x, 7x and 9x.
    Then, 8 years ago, 4x + 7x + 9x – 8 = 56.
    20 x = 64, x = 3.2 (decimal). Solution not possible.

**PRACTICE PROBLEMS**

1.  A wizard named Nepo says "I am only three times my son's age. My father is 40 years more than twice my age. Together the three of us are a mere 1240 years old." How old is Nepo?
    a.  240            b.  360            c.  120            d.  140

2.  In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs?
    a.  6.25           b.  6.5            c.  6.75           d.  7

3.  The sum of the present ages of a father and his son is 60 yrs. 6 yrs ago, father's age was 5 times the age of his son. After 6 yrs, son's age will be.

4.  The captain of a cricket team of 11 members is 26 years old and the wicket keeper is 3 years older. If the ages of these two are excluded, the average age of the remaining players is one year less than the average age of the whole team. What is the average age of the team?
    a.  23 years       b.  24 years       c.  25 years       d.  CBD

5. The average of 9 numbers is 30. The average of first 5 numbers is 25 and that of the last 3 numbers is 35. What is the 6th number?

   a. 20                b. 30                c. 40                d. 50

6. The average of marks of 14 students was calculated as 71. But it was later found that the marks of one student had been wrongly entered as 42 instead of 56 and of another as 74 instead of 32. The correct average is:

   a. 67                b. 68                c. 69                d. 71

7. Average age of a father and his two sons is 27 years. Five years ago, the average age of the two sons was 12 years. If the difference between the ages of the two sons is 4 years, then the present age of the father is:

   a. 34 years          b. 47 years          c. 64 years          d. 27 years

8. Harsha is 40 years old and Rith is 60 years old. How many years ago was the ratio of their ages 3:5?

   a. 10 years          b. 20 years          c. 37 years          d. 5 years

9. The average weight of three men A, B and C is 84 kg. D joins them and the average weight of the four becomes 80 kg. If E, whose weight is 3 kg more than that of D, replaces A, the average weight of B, C, D and E becomes 79 kg. The weight of A is:

   a. 65 kg             b. 70 kg             c. 75 kg             d. 80 kg

10. The average marks scored by Ganesh in English, Science, Mathematics and History is less than 15 from that scored by him in English, History, Geography and Mathematics. What is the difference of marks in Science and Geography scored by him?

    a. 40                b. 50                c. 60                d. data inadequate

11. Peter and Paul are two friends. The sum of their ages is 35 years. Peter is twice as old as Paul was when Peter was as old as Paul is now. What is the present age of Peter?

    a. 20                b. 25                c. 16                d. 22

12. Two years before Paul‟s age is 2times the Alice age and the present age of Paul is 1 ½ times the Alice. What is the presents Paul‟s age?

    a. 2 years           b. 6 years           c. 3years            d. 4years

13. A person bought 5 shirts for Rs 450 each, 4 trousers at Rs 750 each and 12 pairs of shoes at Rs 750 each. What is the average expenditure per article?

    a. Rs 678.5          b. Rs 800            c. Rs 900            d. Rs 1000

14. The average height of the students in a class of 10 is 105cm. If 20 more students with the average height of 120cm join the class, what will the new average height be?

    a. 105 cm            b. 110 cm            c. 112 cm            d. 115 cm

15. A train moves with a speed of 30 km/hr for 12 minutes and for next 8 minutes at a speed of 45km/hr. The average speed of the train is:
    a. 37.5 km/hr          b. 36 km/hr          c. 48 km/hr          d. 30 km/hr

16. The average of first three numbers is the double of the fourth number. If the average of all the four numbers is 12, what will be the value of fourth number?
    a. 6(5/7)          b. 7(6/7)          c. 6(6/7)          d. 7(5/7)

17. The average of runs made by A,B and C is 25. How many runs are made by C if the average runs made by A and B is 22(1/2)?
    a. 28 runs          b. 32 runs          c. 29 runs          d. 30 runs

18. The average age of Monica and Kanchan is 16 years. If their ages are in the ratio of 3:5, find out the age of Monica.
    a. 4          b. 20          c. 12          d. None of these

19. Sita's mother was 4 times of Sita's age ten years ago .After ten years, she will be twice as old as Sita. How old is Sita today?
    a. 10 years          b. 15 years          c. 20 years          d. 22 years.

20. The average age of 12 children is 20 years. If the age of one more child is added, the average decreases by 1. What is the age of the child added later?
    a. 7 years          b. 8 years          c. 9 years          d. CBD

21. The total production of 10 tea estates is 550 tonnes. By opening 2 new estates, the average increases by 3 tonnes. The average production of these two new tea estates ( in tones ) is:
    a. 70          b. 64          c. 67          d. 73

22. If the average of a, b and c is M and ab + bc = -ca, then the average of $a^2$, $b^2$, $c^2$ is
    a. $M^2$          b. $3M^2$          c. $9M^2$          d. $27M^2$

23. My grandfather was 8 times older than me 16 years ago. He would be 3 times my age, 8 years from now. Eight years ago, what was the ratio of my age to that of my grandfather?
    a. 13 : 33          b. 11 : 53          c. 11 : 43          d. 13 : 43

24. In a class, average age of boys is 14 years and that of the girls 12 years. Girls outnumber the boys by 8. What is the average age of all the students in the class?
    a. 15          b. 13          c. CBD          d. Data Inadequate

25. Chandravathi's mother was four times as old as Chandravathi 10 years ago. After 10 years, she will be twice as old as Chandravathi. How old is Chandravathi today?
    a. 20 years          b. 22 years          c. 24 years          d. 18 years

26. A said to B "I am twice as old as you were when I was as old you are now." Sum of their ages is 42. Find their present ages.

a. 12, 20          b. 18, 24          c. 16, 26          d. 17, 25

27. Five years ago, Lata was twice as old as Aruna. Ten years after, Lata will be 4/3 times elder to Aruna. What is the age of Lata today?
    a. 20 years          b. 22 years          c. 24 years          d. 18 years

28. The ratio of Kavathi's age to Laxmi's age is 4:5 and the sum of their ages 81. What will be the ratio after 9 years?
    a. 2:3          b. 4:5          c. 5:6          d. NOTA

29. The average age of five workers in a store was 36 years. When a new worker joined them, the average age of all of them became 37 years. How old was the new worker?
    a. 34 years          b. 42 years          c. 64 years          d. 27 years

30. If Vinay was 1/3 as old as Vikas 5 years back and Vinay is 17 years old now, how old is Vikas now?
    a. 32 years          b. 41 years          c. 53 years          d. 29 years

31. The ratio of the ages of Vina and Jaya at present is 2:3. After four years, the ratio of their ages will be 5:7. What is the present age of Jaya?
    a. 24 years          b. 22 years          c. 32 years          d. 28 years

32. C's age is twice the average age of A, B and C. A's age is one-half the average age of A, B and C. If B is 5 years old, what is the average age of A, B and C?
    a. 14 years          b. 12 years          c. 13 years          d. 10 years

33. Average age of three children in a family is 20% of the average age of the father and the eldest child. The total age of the mother and the youngest child is 39 years. If the father's age is 26 years, what is the age of the second child?
    a. 10          b. 13          c. 12          d. CBD

34. If the average marks of three batches of 55, 60 and 45 students respectively is 50, 55, 60, then the average marks of all the students is:
    a. 53.33          b. 54.68          c. 55          d. NOTA

35. The average monthly income of P and Q is Rs. 5050. The average monthly income of Q and R is Rs. 6250 and the average monthly income of P and R is Rs. 5200. The monthly income of P is:
    a. 3500          b. 4000          c. 4050          d. 5000

36. A person was asked to state his age in yrs. His reply was "Take my age 3 yrs hence, multiply it by 3 and then subtract 3 times my age 3 yrs ago and you will know how old I am". What is the age of the person
    a. 12          b. 27          c. 18          d. Can't say

37. Six persons standing in queue with different age group, after two years their average age will be 43 and seventh person joined with them, hence the current average age has become 45. Find the age of seventh person?
    a. 70                  b. 69                  c. 65                  d. 62

38. There was a grandmother in a village and she had a grandchild. Upon asking her grandchild's age she told that she is as older as many days old as her daughter's age in weeks and as many days as her own age in years. The sum of the three is 130, then how old is the child?
    a. 127 days            b. 200 days            c. 233 days            d. 254 days

39. In a shopping mall with a staff of 5 members the average age is 45 years. After 5 years a person joined them and the average age is again 45 years. What's the age of 6th person?
    a. 25                  b. 20                  c. 40                  d. 40

40. A tutorial has four batches that have 20, 40, 30 and 10 students respectively. If the pass percentage of these classes are 30%, 100%, 60% and 20% respectively. Find the pass percentage of the tutorial.
    a. 72%                 b. 58%                 c. 66%                 d. 64%

## RATIOS, MIXTURES AND PARTNERSHIP

**DRILL – 1 – BRIDGE THREE COMPONENT**

| Given | | Find Out |
|---|---|---|
| A:B = 4:5 | B:C = 6:7 | A:C = |
| A:B = 6:7 | B:C = 8:9 | A:B:C = |
| BC:AC:AB = 1:2:3 | | A:B:C = |
| 1/A : 1/B : 1/C = 2:3:5 | | A:B:C = |

**DRILL – 2 – BRIDGE FOUR COMPONENT**

➢ Given: A: B = 2:5      B: C = 3:1      C: D = 3:5; Find A: B: C: D

➢ Find B's share in Rs. 6300 if A:B = 2:3, B:C = 4:5, C:D = 3:7

➢ Find A:D if A:B = 2:5, B:C = 4:3, C:D = 1:7

**DRILL – 3 – PROPORTIONAL**

Third proportional = $b^2/a$    ⟹    Find the third proportion to 16 and 24

Fourth proportional = b x c / a    ⟹    Fourth proportion to 16,4 and 4

Mean proportion = $\sqrt{(a \times b)}$    ⟹    Mean proportion of 0.32 and 0.02
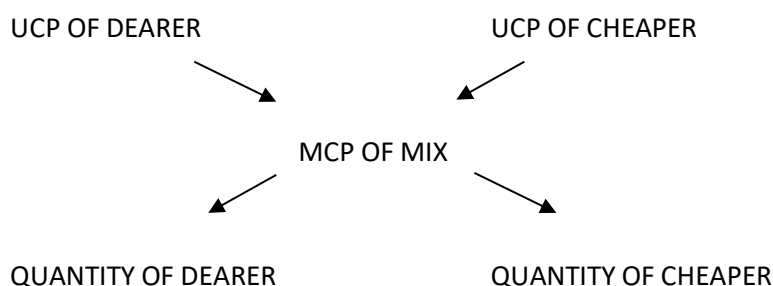
**DRILL – 4 – ACTUALS AND ASSUMPTIONS**

➢ The scores of P and Q in a test are in the ratio of 5:4. If their total score is 135, find P's score?
   a. 45      b. 54      c. 63      d. 75

➢ A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets Rs. 1000 more than D, what is B's share?
   a. 1000      b. 2000      c. 3000      d. NOTA

➢ Two number are in the ratio 3 : 5. If 9 is subtracted from each, the new numbers are in the ratio 12 : 23. The smaller number is:

a. 27          b. 30          c. 33          d. 36

➢ Seats for Mathematics, Physics and Biology in a school are in the ratio 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats?

a. 1:2:3          b. 2:3:4          c. 3:4:5          d. 4:5:6

➢ Salaries of Ravi and Sumit are in the ratio 2 : 3. If the salary of each is increased by Rs. 4000, the new ratio becomes 42 : 57. What is Sumit's increased salary?

a. 19000          b. 19500          c. 20000          d. 20500

## DRILL – 5 – ALLIGATIONS

Alligation rule:

UCP OF DEARER          UCP OF CHEAPER

MCP OF MIX

QUANTITY OF DEARER          QUANTITY OF CHEAPER

➢ In what ratio must a grocer mix two varieties of pulses costing Rs. 15 and Rs. 20 per kg respectively so as to get a mixture worth Rs. 16.50 per kg?

a. 1:2          b. 2:3          c. 1:6          d. 7:3

➢ In what ratio must water be mixed with milk to gain $16\frac{2}{3}$% on selling the mixture at cost price?

a. 1:2          b. 2:3          c. 1:6          d. 7:3

➢ In what ratio must water be mixed with milk costing Rs. 12/ litre to obtain a mixture worth of Rs. 8/ litre?

a. 1:2          b. 2:3          c. 1:6          d. 7:3

➢ Find the ratio in which rice at Rs. 7.20 a kg be mixed with rice at Rs. 5.70 a kg to produce a mixture worth Rs. 6.30 a kg.

a. 1:2          b. 2:3          c. 1:6          d. 7:3

➢ Tea worth Rs. 126 per kg and Rs. 135 per kg are mixed with a third variety in the ratio 1 : 1 : 2. If the mixture is worth Rs. 153 per kg, the price of the third variety per kg will be:

a. 170.25          b. 171.50          c. 175          d. NOTA

**DRILL 6 – ALLIGATIONS Vs PROFIT**

➤ In what ratio must a grocer mix two varieties of tea worth Rs. 60 a kg and Rs. 65 a kg so that by selling the mixture at Rs. 68.20 a kg he may gain 10%?

a. 5:4          b. 4:3          c. 3:2          d. NOTA

➤ How much salt(in kg) worth 42 P / kg must one mix with 25 kg of salt worth 24 P / kg so that he may, on selling the mixture at 40 P / kg, gain 25% on the outlay.

a. 18          b. 20          c. 22          d. 24

➤ How many kilogram of sugar costing Rs. 9 per kg must be mixed with 27 kg of sugar costing Rs. 7 per kg so that there may be a gain of 10% by selling the mixture at Rs. 9.24 per kg?

a. 45          b. 54          c. 27          d. 63

➤ A merchant has 1000 kg of sugar, part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18% profit is:

a. 600          b. 575          c. 550          d. NOTA

**DRILL 7 – REMOVAL AND REPLACEMENT**

Let the mixture contain A and B, Amount of mixture = M. Now, 'x' unit of mixture is taken out and replaced with any one ingredient, say B. This is repeated 'n' times.

Now

$$\frac{\text{Amount of A left out}}{\text{Amount of A originally present}} = [1 - (x/M)]^n$$

➤ From a cask of milk containing 15 litres, 2 litres are drawn out and the cask is filled up with water. If the same process is repeated for five times what will be the no. of litres of milk left in the cask?

➤ Eight litres are drawn from a cask full of wine and is then filled with water. This operation is performed 3 more times. The ratio of the quantity of wine now left in cask to that of the water is 16:81. How much wine did the cask hold originally.

a. 20          b. 22          c. 24          d. 26

➤ A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

a. 29.16          b. 30.35          c. 28.75          d. 31.6

**DRILL 8 – PARTNERSHIP**

- Investment ratio = Profit ratio

- Suppose A and B invest Rs. *x* & Rs. *y* respectively for a year in a business, then at the end of the year:
  (A's share of profit): (B's share of profit) = *x*: *y*.

- Suppose A invests Rs. x for p months and B invests Rs. y for q months then,
  (A's share of profit) : (B's share of profit)= xp : yq.

➢ A,B and C enter into a partnership. A contributes one third of the capital while B contributes as much as A and C together contributed. If the profits at the year amounted to Rs. 840, what would each receive?

➢ A and B invest in a business in the ratio 3 : 2. If 5% of the total profit goes to charity and A's share is Rs. 855, the total profit is:
  a. 1000          b. 1200          c. 1500          d. 1800

➢ A, B and C jointly thought of engaging themselves in a business venture. It was agreed that A would invest Rs. 6500 for 6 months, B, Rs. 8400 for 5 months and C, Rs. 10,000 for 3 months. A wants to be the working member for which, he was to receive 5% of the profits. The profit earned was Rs. 7400. Calculate the share of B in the profit.
  a. 2570          b. 2660          c. 2780          d. NOTA

**GOOGLY QUESTIONS**

1. 2A=3B=4C then A: B: C?
   **Solution:**
   Since, 2A = 3B = 4C, A:B:C = 2:3:4
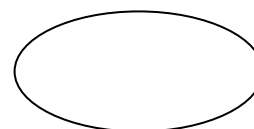
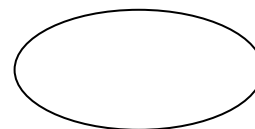2. A sum of Rs 1162 is divided among A, B and C, such that 4 times A's share is equal to 5 times B's share and 7 times C's share. What is the share of C?
   **Solution:**
   4A = 5B = 7C
   A:B:C = 35:28:20
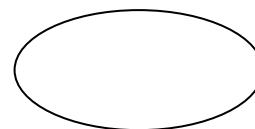   C's share = (20 / 83) x 1162 = 280

3. The sum of squares of 3 numbers is 532. And their ratio of the first to the second as also of the second to the third is 3:2. What is the second number?
   **Solution:**
   A:B = 3:2

B:C = 3:2

A:B:C = 9:6:4

Since sum of the squares of A,B and C is 532

81x+36x+16x = 532 => 133x = 532

X = 4, therefore the second number is 6x = 24.

4. The ratio of milk and water –milk mixture is 2:3. How much water should be added to 60 litres of the mixture to make the ratio of milk and mixture as 1:3?

Solution:

$$\frac{\text{Quantity of milk}}{\text{Quantity of mixture}} = 2/3$$
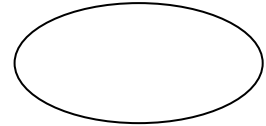
Now, x litres of water is added to 60 litres of mixture to obtain the new ratio as 1:3.

$$\frac{\text{Quantity of milk}}{\text{Quantity of mixture}} = \frac{2/5 \; X \; (60 + x)}{60}$$

X = 45 litres

## PRACTICE PROBLEMS

1. A and B together have Rs. 1210. If $\frac{4}{15}$ of A's amount is equal to $\frac{2}{5}$ of B's amount, how much amount does B have?

   a. 460                b. 484                c. 550                d. 664

2. The ratio of the number of boys and girls in a college is 7 : 8. If the percentage increase in the number of boys and girls be 20% and 10% respectively, what will be the new ratio?

   a. 8:9                b. 17:18                c. 21:22                d. CBD

3. The sum of three numbers is 98. If the ratio of the first to second is 2 :3 and that of the second to the third is 5 : 8, then the second number is:

   a. 20                b. 30                c. 48                d. 58

4. If Rs. 782 be divided into three parts, proportional to $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$, then the first part is:

   a. 182                b. 190                c. 196                d. 204

5. In a bag, there are coins of 25 p, 10 p and 5 p in the ratio of 1 : 2 : 3. If there is Rs. 30 in all, how many 5 p coins are there?

   a. 50                b. 100                c. 150                d. 200

6. The ratio of the number of marbles with R and S is 19:13. If R gives S, 30 marbles, both will have equal number of marbles. Find the number of marbles with R?

   a. 170                b. 150                c. 190                d. 180

7. R and S are partners sharing profits & losses in the ratio of 2:1. They admit T into partnership giving him 1/5<sup>th</sup> share in profits which he acquires from R & S in the ratio of 1:2. Calculate the new profit sharing ratio.

    a. 1:2:1            b. 3:1:1            c. CBD            d. NOT

8. The ratio of the monthly incomes of A and B is 3:4. The ratio of their monthly expenditures is 4:5. Find the ratio of their monthly savings, if the savings of A is 1/4th of his income.

    a. 13:16            b.15:13            c. 12:19            d. 12:13

9. A man divides his property so that ratio of his son's share to his wife's and the ratio of the wife's share to his daughter are both 3:1. If the daughter gets Rs. 10000 less than the son, then the total worth of his property is:

    a. 15000            b. 15750            c. 16000            d. 16250

10. A, B and C enter into a partnership in the ratio $\frac{7}{2} : \frac{4}{3} : \frac{6}{5}$. After 4 months, A increases his share 50%. If the total profit at the end of one year be Rs. 21,600, then B's share in the profit is:

    a. Rs. 2100            b. Rs. 2400            c. Rs. 3600            d. Rs. 4000

11. A, B, C subscribe Rs. 50,000 for a business. A subscribes Rs. 4000 more than B and B Rs. 5000 more than C. Out of a total profit of Rs. 35,000, A receives:

    a. Rs. 8400            b. Rs. 11900            c. Rs. 13600            d. Rs. 14700

12. A starts business with Rs. 3500 and after 5 months, B joins with A as his partner. After a year, the profit is divided in the ratio 2 : 3. What is B's contribution in the capital?

    a. Rs. 7500            b. Rs. 8000            c. Rs. 8500            d. Rs. 9000

13. A, B, C rent a pasture. A puts 10 oxen for 7 months, B puts 12 oxen for 5 months and C puts 15 oxen for 3 months for grazing. If the rent of the pasture is Rs. 175, how much must C pay as his share of rent?

    a. Rs. 45            b. Rs. 50            c. Rs. 55            d. Rs. 60

14. A and B started a business in partnership investing Rs. 20,000 and Rs. 15,000 respectively. After six months, C joined them with Rs. 20,000. What will be B's share in total profit of Rs. 25,000 earned at the end of 2 years from the starting of the business?

    a. Rs. 7500            b. Rs. 9000            c. Rs. 9500            d. Rs. 10000

    (15-23) Read the following passage and answer the question given below:
    A,B and C start a automobile space part shop investing Rs. 12000, Rs. 8000 and Rs. 24000 respectively. A and C are the sleeping partner and B manages the business. If 12% of the profit is given to B as salary for managing the business and rest is divided among the partners according to the investments.

15. If a profit of Rs. 2800 is obtained; find B's salary for managing the business

    a. Rs. 336            b. Rs. 436            c. Rs. 288            d. Rs. 296

16. If a profit of Rs. 4560 is obtained, find B's total income.
    a. Rs. 729.6          b. Rs. 1277          c. Rs. 4012.84          d. Rs. 547.2

17. If a profit of Rs. 8000 is obtained find A's share of profits.
    a. Rs. 1620          b. Rs. 1425          c. Rs. 1920          d. Rs. 960

18. If a profit of Rs. 4600 is obtained find C's share of profits.
    a. Rs. 4048          b. Rs. 2208          c. Rs. 1208          d. Rs. 1468

19. Find differences between incomes of B and C if a profit of Rs. 6000 is obtained?
    a. Rs. 1000          b. Rs. 1500          c. Rs. 2000          d. Rs. 1200

20. If A's share of the profit is Rs. 4000 find the total profit obtained?
    a. Rs. 10000          b. Rs.16667          c. Rs. 14667          d. none of these

21. If B's salary is Rs. 800 find the total profit obtained.
    a. Rs. 6000          b. Rs. 6667          c. Rs. 8000          d. Rs. 7200

22. If C's share income is Rs. 2000 find total profit obtained.
    a. Rs. 4100          b. Rs. 3600          c. Rs. 4167          d. Rs. 4075

23. If A's share is Rs. 4000 then find C's share of the total profits obtained?
    a. Rs. 2000          b. Rs. 6000          c. Rs. 7200          d. Rs. 8000

24. The ratio of milk and water in a mixture of 35 litres is 4:1. How much water must be added
    to the mixture so that the ratio of milk and water be 3:2.
    a. 15 3/5          b. 11 2/3          c. 162/5          d. NOTA

25. In 70 litres of mixture of milk and water, the quantity of water is 10%. How much water
    should be added so that new mixture may contain 25%.
    a. 11          b. 12          c. 13          d. 14

26. In two alloys, the ratio of copper and zinc are 3:4 and 5:8. If 14 kg of first alloy and 26 kg of
    second alloy are mixed, then find the ratio of copper and zinc in the new alloy.
    a. 2/3          b. 3/2          c. 1/3          d. ½

27. A bag contains one rupee, fifty paise, twenty five paise and 10 paise coins in the proportion
    1:3:5:7. If the total amount is Rs.22.25. find the total number of coins.
    a. 100          b. 90          c. 80          d. 50

28. Three friends Alice, Bob and Charlie divide $1105 amongst them in such a way that if $10, $
    20 and $15 are removed from the sums that Alice, Bob and Charlie received respectively,
    then the share of the sums that they got will be in the ratio of 11:18:24. How much did
    Charlie receive?
    a. $ 495          b. $ 510          c. $ 480          d. $375

29. In a village, 8% of men were equal to the 48% of the women. What is the ratio of men to women?

    a. 4:1  b. 6:1  c. 8:1  d. 16:1

30. Milk and water in a vessel **A** are in the ratio 5:4 and in vessel **B** are in the ratio 3:4. In what ratio they must be mixed to get a new mixture with half milk and half water?

    a. 5:9  b. 8:9  c. 7:9  d. NOTA

31. X is 3 years younger to Y. X's father is a businessman who invested 10000/- at 8% rate of interest n obtained his amount after 10 years. Y's father is a job holder who invested around 20000 at 2% rate n obtained his amount after 20 years. After 5 years the ratio of ages of X n Y is 1:2. Now X's father is 20 years older to Y n Y' father is 30 years more than X. After 20 years, X's mother asks X's father to purchase a LCD TV which costs around 45000/-. What is the age of X and Y together?

    a. x=2, y=5  b. x=5, y=2  c. x=3, y=5  d. x=5, y=3

32. If a: b = 2: 3, find 3a + 4b/ 4a+5b?

    a. 6: 7  b. 18:23  c. 19:23  d. 20: 23

33. If a : b = b : c = 2 : 3, find a : b : c.

    a. 4: 6: 9  b. 2: 3: 3  c. 3: 3: 4  d. 9: 6: 4

34. If p : q = 5 : 4 and p = a + band q = a - b, find a : b.

    a. 1:9  b. 9:1  c. 5: 4  d. 4: 5

35. The ratio of the number of ladies and gentlemen in a party is 3: 4. If eight ladies join the party, the ratio of ladies and gentlemen would become 5: 4. Find the number of gentlemen in the party.

    a. 8  b. 12  c. 16  d. 20

36. The number of marbles with A and B are in the ratio of 10: 11. Which of the following cannot be a possible number of marbles with A and B together?

    a. 189  b. 210  c. 231  d. 153

37. The ratio of the number of students in three classes A, B and C is 3: 7: 8. If ten students leave C and join B, the ratio of the number of students in B and C would reverse. Find the total number of students in the three classes.

    a. 150  b. 160  c. 180  d. 210

38. A, Band C are three quantities. A varies directly with B when C is constant. A varies directly with C when B is constant. A = 6000 if B = 20 and C = 30. Find A if B = 40 and C = 60.

    a. 18000  b. 21000  c. 27000  d. 24000

39. X, Y and Z are three quantities. X varies inversely with Y when Z is constant. Y varies inversely with Z when X is constant. When Y = 8, and Z = 7, X = 30. Find X if Y = 16 and Z = 21.
    a. 4 5                  b. 48                  c. 10                  d. 15

40. If a is one fourth of b and b is half of c, find a: c.
    a. 8:1                  b. 4:1                  c. 1:4                 d. 1:8

41. Four friends jointly bought a plot worth Rs.5, 60,000. For every 7 rupees A paid, B paid 15 rupees and for every 5 rupees  B paid, C paid 12 rupees. The amounts paid by C and D are in the ratio of 2: 3. What amount did C spend on purchasing the plot?
    a. Rs.1,80,000          b. Rs.2,70,000         c. Rs.75,000           d. Rs.1,62,000

42. A year ago the ratio of salaries of A and B was 2 : 3. The ratios of the salary of last year to that of the present year, in the case of A and B respectively are 3: 4 and 5: 7. If this year the difference in their salaries is Rs.1150, what is B's salary this year?
    a. Rs.3150              b. Rs.3350             c. Rs.32.50            d. Rs.3050

43. Rs.1080 was divided among A, B and C in a certain ratio. Had each of them received RS.6 less than their actual share, then for every part A got, C would have got 2 parts and for every 2 parts A got, B would have got 3 parts. How much was B's actual share?
    a. Rs.354              b. Rs.472             c. Rs.236             d. Rs.360

44. The ratio of incomes of A and B and also those of B and C are in the ratio of 2: 3. A third of C's income exceeds half of A's income by Rs.80. If each of them spend the same amount of money, then their savings are in the ratio of 1: 9: 21. What is their combined expenditure?
    a. Rs.300              b. Rs.280             c. Rs.450             d. Rs.900

45. In a class, there are some boys and girls. If the number of girls doubles, then the ratio of girls to boys becomes 3: 4. What is the strength of the class?
    a. 40                  b. 35                 c. 45                 d. 55

46. In a farm which has only cocks and bulls, total count of legs was 12 less than 4 times the total count of heads. How many legs are counted in total?
    a. 16                  b. 20                 c. 24                 d. CBD

47. Purana Island still trades by using the barter system where goods are bartered and no money transactions take place. Here 6 mangoes and 5 oranges have the same value as 4 mangoes and 8 oranges. If a banana has a value equal to that of 22 oranges and I have only 7 oranges, how many mangoes do I have to part with to get a banana?
    a. 5                   b. 20                 c. 15                 d. 10

48. If Rs.1980 is to be distributed to three men A, B and C in such a way that when Rs. 4, Rs. 5 and Rs.11 are added to their respective shares, the ratio becomes 4 : 5: 11, what is B's share?

    a. Rs.500          b. Rs.495          c. Rs.505          d. Rs.490

49. In two alloys, copper and tin are mixed in the ratio 5 : 1 and 1 : 3: If 24 kg of the first alloy, 32 kg of the second alloy and some pure copper are melted together, then a new alloy is formed in which the ratio of copper to tin is 2 : 1. Find the weight of the new alloy?

    a. 76 kg          b. 84 kg          c. 88 kg          d. 104 kg

50. The ratio between the number of passengers travelling by I & II Class between two railway stations is 1: 50, whereas the ratio of the I & II Class fares between the same stations is 3 : 1. If on a particular day, Rs. 1325 were collected from the passengers travelling between these stations, what was the amount collected from the II Class passengers?

    a. Rs.1250          b. Rs. 1100          c. Rs. 1000          d. Rs.1150

## PERCENTAGES, SIMPLE INTEREST AND COMPOUND INTEREST

### Drill 1 – Percentage as Fractions and Decimals

Decimals, fractions and Percentages are just different ways of expressing the same value.

| Percentage | Decimal | Fraction |
|---|---|---|
| 1% | 0.01 | 1/100 |
| 10% | ? | 1/20 |
| 20% | 0.2 | ? |
| ? | 0.25 | ¼ |
| ? | ? | ½ |
| ? | 1 | 1 |
| 150% | ? | ? |
| 200% | 2 | ? |

➢ 9% of what is 36?

➢ If 40% of a number exceeds the 25% of it by 54, find the number.

➢ What % of 6.5 litres is 130 ml?

➢ What percentage of 6 dozens is 36?

➢ 50 % of a% of b% is 75% of b% of c%. Which of the following is c?
   a. 1.5a              b. 0.667a              c. 0.5a              d. 1.25a

➢ 65% of a number is 21 less than 4/5$^{th}$ of that number. What is the number?
   a. 150              b. 170              c. 120              d. 140

➢ How is ½% expressed as a decimal fraction?
   a. 0.0005              b. 0.005              c. 0.05              d. 0.5

➢ If 10% of 20% of x = Rs 5, find the value of x
   a. Rs 250              b. Rs 240              c. Rs 270              d. Rs 230

- A period of 4hrs 30min is what percent of a day?
  a. 18(3/4)%            b. 20%            c. 16(2/3)%            d. 19%

- 12 is 0.2% of?
  a. 4800            b. 6000            c. 7200            d. 8400

- What percent is 2 minutes 24 seconds of an hour?
  a. 4            b. 6            c. 8            d. 10

## DRILL – 2 – PERCENTAGE CHANGE

> Percentage change = (Difference between the initial and final value / Initial value) x 100

- If the price of a net book is Rs. 15000 in the year 2010 and Rs. 12000 in the year 2013, the percentage change is
  a. 15%            b. 20%            c. 24%            d. 25%

- The present salary of Mr. A is 30000 per month. This will be increased by 15% in the next year. What will be the increased salary of A?
  a. 35000            b. 34500            c. 33000            d.33500

- If the radius of a circle is reduced by 50%, how much percent will be the decrease in its area?
  a. 72%            b. 63%            c.  75%            d. 86%

- In a shipment of 120 machine parts, 5 percent were defective. In a shipment of 80 machine parts, 10 percent were defective. For the two shipments combined, what percent of the machine parts were defective?
  a. 6.5%            b. 7%            c. 7.5%            d. 8%

- A cow and a calf cost Rs.2000 and Rs.1400 respectively. If the price of the cow and that of the calf is increased by 20% and 30% respectively then the price of 1 dozen cows and 2 dozens calves is:
  a. Rs. 72,480            b. Rs. 71,360            c. Rs. 74, 340            d. NOTA

- Two numbers are respectively 30% and 40% of a third number. What percent is the first of the second?
  a. 60            b. 65            c. 70            d. 75

- The population of a city increases by 20% every year. If the present population is 72,000, then what was the population 2 years ago?
  a. 40000            b. 50000            c. 60000            d. None of these

**DRILL – 3 – TWO STEP CHANGE**

> Net percentage change = x + y + xy /100

where x = first percentage change.

y = second percentage change.

➤ If a number is increased by 20% and then it decreases by 15%, then find the percentage change in the number.
a. 5%                 b. 3%                 c. 2%                 d. NOTA

➤ If the length of the rectangle increases by 30% and the breadth decreases by 12%, the find the percentage in the area of the rectangle.
a. 14.4% increase     b. 14.4% decrease     c. 15.4% increase     d. 15.4% decrease

➤ The price of petrol has increased by 40%. By what % should he reduce the consumption of petrol so that he is able to balance his budget?
a. 33.3           b. 28.57           c. 25           d. 14.28

➤ If Ram's salary is 20% less than Shyam's salary, by what percentage is Shyam's salary more than Ram's?
a. 50%           b. 25%           c. 75%           d. 20%

**DRILL – 4 – RELATING SIMPLE AND COMPOUND INTEREST**

> SI = PNR / 100

> CI = P (1 + R/N.100)$^{NT}$ - P

➤ A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:
a. Rs. 650           b. Rs. 690           c. Rs. 698           d. Rs. 700

➤ Mr. Thomas invested an amount of Rs. 13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs. 3508, what was the amount invested in Scheme B?
a. Rs. 6400           b. Rs. 6500           c. Rs. 7200           d. Rs. 7500

➤ There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 12,000 after 3 years at the same rate?
a. Rs. 2160           b. Rs. 3120           c. Rs.3972           d. Rs. 6240

➤ On what sum of money lent out at 9% pa simple interest for six years does the simple interest amount to Rs.810.?

a. Rs. 1000          b. Rs. 1200          c. Rs. 1500          d. Rs. 1800

➢ Compute the compound interest on Rs. 2000 for 3 years at 10% per annum, when compounded half-yearly

## DRILL – 5 – DIFFERENCE BETWEEN SIMPLE INTEREST AND COMPOUND INTEREST

| WHEN T = 2 YEARS | WHEN T = 3 YEARS |
|---|---|
| $CI - SI = P(R/100)^2$ | $CI - SI = P[(R/100)^3 + 3(R/100)^2]$ |

➢ The difference between simple and compound interests compounded annually on a certain sum of money for 2 years at 4% per annum is Re. 1. The sum (in Rs.) is:
a. 625          b. 630          c. 640          d. 650

➢ The difference between simple and compound interests on a certain sum at 15% per annum for 3 years is Rs. 283.50. Find the sum.
a. 5000          b. 4000          c. 5500          d. 4500

## DRILL – 6 – SPECIAL CASE OF RATE OF COMPOUND INTEREST

WHEN RATE % IS NOT SAME FOR EVERY YEAR

$$A = P (1+R/100)^{T1} \times (1+R/100)^{T1}$$

WHEN RATE IS COMPOUNDED YEARLY BUT TIME IS A FRACTION

$$A = P (1 + R/100)^{WT} \times (1 + FTxR/100)$$

➢ Find the amount of Rs. 4000 for 5 years compounded annually, the rate of interest being 10% for the first three years and 20% for the next two years.
a. 8456.55          b. 7555.55          c. 7666.56          d. 8333.56

➢ Find the compound interest on Rs.2400 at 20% per annum for 3 ¾ years.
a. 2369.28          b. 2169.28          c. 2465.28          d. 2333.23

## DRLL – 7 – APPLICATIONS OF COMPOUND INTEREST
The applications of compound interest are
- Growth
- Appreciation
- Depreciation etc

➢ The bacteria in a culture grows by 10% in first 2 hrs and decreases by 10% in next one hour and again increases by 5% in next two hrs. If the original count of the bacteria in the sample is 40000. Find the bacteria count at the end of 5 hrs?
a. 47500        b. 47950        c. 48025        d. CBD

➢ The population of a city 2 yrs ago was 1,25,000. Due to migration from cities, it decreases every year @ the rate of 4% pa. Find the present population. How many persons have migrated in last two yrs?
a. 9500         b. 9800         c. 10025        d. 10800

➢ A teak tree was planted 3 yrs ago. The rate of its growth is 30% pa. If at present the ht of the tree is 670cm, what was it when the tree was planted?
a. 295 cm       b. 305 cm       c. 350 cm       d. 405 cm

➢ The value of a TV that was purchased in January 1999 depreciates @ 12% pa. if its value in Jan 2001 is Rs. 4,840, then what was purchase price of the TV.
a. Rs. 5950     b. Rs. 6250     c. Rs. 6550     d. Rs. 6890

**GOOGLY QUESTIONS**

1. A number if increased by 12% and again increased by 12%. Find the net percentage increase.
   Solution:
   Since it is increased twice, net percentage increase is 12 + 12 = 24%
   Net 24% increase.
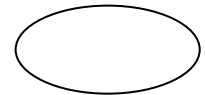
2. The population of the village is 1,00,000. Increase rate is 10% per annum. Find the population at the starting of fourth year.
   Solution:
   Increased population = $100000(110/100)^4$ = 146410
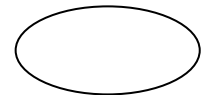
**PRACTICE PROBLEMS**

1. Last year Indian cricket team played 40 one day matches out of which they managed to win only 40%.This year, so far it has played some matches, which has made it mandatory for it to win 80% of remaining matches to maintain its existing winning %. Find the no. of matches India played in this year
a. 30           b. 25           c. 28           d. CBD

2. The entrance ticket at the INOX theatre in Chennai is worth Rs. 250. When the price of the ticket was lowered, the sale of tickets increased by 50% while the collections recorded a decrease of 17.5%. Find the deduction in the ticket price.

a. Rs 150        b. Rs 112.5        c. Rs 105        d. Rs 120

3. Ravi"s monthly salary is A rupees. Of this, he spends X rupees. The next month he has an increase of C% in his salary and D% in his expenditure. The new amount saved is:

a. A(1+C/100)-X(1+D/100)        b. (A/100)(C-d.X(1+D/100)

c. X(C-d./100        d. X(C+D)/100

4. The population of a village is 1,00,000. Increase rate per annum is 10%.Find the population at the starting of the 4th year.

a. 1,33,110        b. 1,21,000        c.1,33,000        d. NOTA

5. After receiving 2 successive raises, Anand's salary became equal to 15/8 times of his initial salary. By how much % was the salary raised the first time if the second raise was twice as high (in %) as the 1st?

a. 15%        b. 20%        c. 25%        d. 30%

6. After 3 successful equal % rise in the salary of 100 rupees turned into 140 rupees and 49 paisa. Find the % rise in salary.

a. 12%        b. 22%        c. 66%        d. 82%

7. X"s salary is 1st increased by 25% and then decreased by 20%.The result is the same as Y"s salary is increased by 20% and then reduced by 25%. Find the ratio of Ys salary to that of Xs?

a. 4:3        b. 11:10        c. 10:9        d. NOTA

8. If the length, breadth &height are decreased, decreased &increased by 5%, 5% and 20% respectively, then what will be the impact on the surface area of the cube?

a. 7.25%        b. 5%        c. 8.33%        d. 6.08%

9. Due to a decrease of 25% in the price of sugar per kilogram, one is able to buy 10 more kgs of sugar for the same price of Rs. 600. Find the reduced rate of the sugar?

a. Rs.15        b. Rs.16        c. Rs.12        d. Rs.14

10. Due to a 25% hike in the price of rice per kilogram, a person is able to purchase 20 kg less for Rs. 400. Find the increased price of rice per kilogram

a. Rs.5        b. Rs.6        c. Rs.10        d. Rs.4

11. Of the adult population in Kerala, 45% of men and 25% of women are married. What % of the total population of adults is married (assume that no man marries more than 1 woman and vice versa)?

a. 33.3%        b. 32.14%        c. 31.1%        d. NOTA

12. Rice production in a country increased by 25% from 2000 to 2004. It increased by 20% from 2004 to 2008. Find the percentage increase in the rice production from 2000 to 2008.
    a. 20%  b. 30%  c. 40%  d. 50%

13. In 2002, R"s salary was Rs. 24000. In 2001, his salary was equal to that of S. R"s salary in 2001 was 20% less than his salary in 2002. S"s salary in 2002 was 20% more than his salary in 2001. By what percentage is the sum of the salaries of S in both the years more/less than that of R in both the years?
    a. 2 2/9  b. 4 2/9  c. 5 2/9  d. 3 2/9

14. The ratios of the salaries of A and B is 2:2 1/7. By what percentage is B"s salary greater than A"s salary?
    a. 7 1/7  b. 9 1/7  c. 5 1/7  d. 3 1/7

15. The population of a city quadrupled from 2001 to 2002. Find the % increase.
    a. 400%  b. 500%  c. 300%  d. 4%

16. Ravi's salary before increment was 20% of the family's total income. His increment was 1/4th of his salary. After his increment what percentage of his total income of his family is his new salary?
    a. 16 %  b. 20%  c. 33 %  d. 25%

17.  A secures 38% of the total marks in an exam and gets 18 marks more than the pass mark. B secures 27% if the total marks in the same exam and fails by 37 marks. What is the pass mark as a percentage of the total marks?
    a. 28%  b. 34.4%  c. 32.2%  d. 35%

18. In Mathematics examination, a student scored 30% in the first paper of 180 marks. How much percentage marks should he score in the second paper of 150 marks if he is to get an overall percentage of at least 50%.
    a. 20  b. 65  c. 30  d. 74

19. What will be the compound interest on a sum of Rs. 25,000 after 3 years at the rate of 12 p.c.p.a.?
    a. Rs. 9000.30  b. Rs. 9720  c. Rs. 10123.20  d. Rs. 10483.20

20. The least number of complete years in which a sum of money put out at 20% compound interest will be more than doubled is:
    a. 3  b. 4  c. 5  d. 6

21. Simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on Rs. 4000 for 2 years at 10% per annum. The sum placed on simple interest is:
    a. 1550  b. 1650  c. 1750  d. 2000

22. The difference between simple interest and compound on Rs. 1200 for one year at 10% per annum reckoned half-yearly is:
    a. 2.50          b. 3          c. 3.75          d. 4

23. The difference between compound interest and simple interest on an amount of Rs. 15,000 for 2 years is Rs. 96. What is the rate of interest per annum?
    a. 8          b. 10          c. 12          d. NOTA

24. The compound interest on a certain sum for 2 years at 10% per annum is Rs. 525. The simple interest on the same sum for double the time at half the rate percent per annum is:
    a. 400          b. 500          c. 600          d. 800

25. Two students appeared at an examination. One of them secured 9 marks more than the other and his marks was 56% of the sum of their marks. The marks obtained by them are:
    a. 39, 30          b. 41, 32          c. 42, 33          d. 43, 34

26. If 20% of a = b, then b% of 20 is the same as:
    a. 4% of a          b. 5% of a          c. 20% of a          d. NOTA

27. In a certain school, 20% of students are below 8 years of age. The number of students above 8 years of age is $\frac{2}{3}$ of the number of students of 8 years of age which is 48. What is the total number of students in the school?
    a. 72          b. 80          c. 120          d. 100

28. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was:
    a. 2700          b. 2900          c. 3000          d. 3100

29. Hans and Bhaskar have salaries that jointly amount to Rs. 10000 per month. They spend the same amount monthly and then it is found that the ratio of their savings is 6:1. Which of the following can be Han's salary?
    a. 6000          b. 5000          c. 3000          d. 4000

30. Ram spends 20% of his monthly income on his household expenditure, 15% of the rest on books, 30% of the rest on clothes and saves the rest. On counting he comes to know that he has finally saved Rs. 9520. Find his monthly income.
    a. 10000          b. 12000          c. 15000          d. 20000

31. Vicky's salary is 75% more than Ashu's. Vicky got a raise of 40% on his salary while Ashu got a raise of 25% on his salary. By what percent is Vicky's salary more than Ashu's?
    a. 96%          b. 51.1%          c. 90%          d. 52.1%

32. How many litres of pure acid are there in 9 litres of a 20% solution?

    a. 2 litres          b. 1.4 litres          c. 1 litres          d. 1.8 litres

33. The price of a car is Rs. 3,25,000. It was insured to 85% of its price. Unfortunately, the car was damaged completely in an accident and the insurance company paid 90% of the insurance. What was the difference between the price of the car and the amount received?

    a. Rs. 76375          b. Rs. 34000          c. Rs. 82150          d. Rs. 70000

34. If number x is 10% less than another number y and y is 10% more than 125, then find x?

    a. 123          b. 122          c. 122.25          d. 123.75

35. A house wife saved Rs. 250 in buying a garment for which she had spent Rs. 2500. Approximately how much percentage she saved in the transaction?

    a. 9%          b. 10%          c. 7%          d. 6%

36. A pipe X is 30 meters and 45% longer than another pipe Y. find the length of the pipe Y.

    a. 20.12          b. 20.68          c. 20          d. 20.5

37. If the price of petrol increases by 25% and John intends to spend only an additional 15% on petrol, by how much percentage will he reduce the quantity of petrol purchased?

    a. 8%          b. 7%          c. 10%          d. 6%

38. Simon took a loan of Rs. 12000 with simple interest for as many years as the rate of interest. If he paid Rs. 5880 as interest at the end of the loan period, what was the rate of interest?

    a. 6%          b. 8%          c. 9%          d. 7%

39. A sum of money amounts to Rs. 9800 after 5 years and Rs. 12005 after 8 years at the same rate of interest per annum. What is the rate percent involved?

    a. 6%          b. 8%          c. 12%          d. 15%

40. A certain amount earns simple interest of Rs. 1750 after 7 years. Had the interest been 2% more, how much more interest would it have earned?

    a. 35          b. 245          c. 350          d. CBD

41. Mr. A borrowed a certain sum from Mr. B at a certain rate of simple interest for 2 years. He lent this sum to Mr. C at the same rate of interest compounded annually for the same period. At the end of 2 years Mr. B received Rs. 2400 as compound interest from Mr. C but paid only Rs. 2000 as simple interest to Mr. A. Find the rate of interest.

    a. 40%          b. 50%          c. 30%          d. 20%

42. A truck that usually covers a distance of 1000 km with a particular speed now covers a distance of 1400 km due to an increase in speed by 30%. What would be the percentage change in time due to the increase of speed?

    a. Increase of 7 9/13%                    b. Decrease of 7 9/13%

    c. Increase of 9 9/13%                    d. Decrease of 9 9/13%

43. The sales of a business in 1997 were 30% less than sales in 1996. By what percent must the sales in 1998 be approximately increased to bring to the level of 1996
    a. 43%            b. 49%            c. 39%            d. 36%

44. In a town, there are 3200 men and 2500 women. If the number of men decreases by 2% and the number of women increases by 4%, then what is the percentage increase or decrease in the total population?
    a. 63%            b. 49%            c. 0.63%            d. 0.49%

45. A woman has a certain number of mangoes of which 10% are bad. She gives 80% of the remainder in charity. Then she has 252 left. How many she had at first?
    a. 1400            b. 1490            c. 1300            d. 1360

46. When 75% of a number is added to 75, the result is the number again. Find the number.
    a. 140            b. 250            c. 300            d. 360

47. A man gave 35% of his sum of money to his son and 25% to his daughter and 50% of the remaining to a school. Still he had Rs. 2000 with him. Find his total sum.
    a. 14000            b. 15000            c. 12000            d. 10000

48. At an election, a candidate secures 40% of the votes but is defeated by the other candidate by a majority of 298 votes. Find the total number of votes recorded?
    a. 1430            b. 1490            c. 1390            d. 1360

49. Rs. 3510 are so divided among A, B and C that 50% of A's share, 33 1/3 % of B's share and 25% of C's share are equal. How much will C receive?
    a. 1540            b. 1550            c. 1560            d. NOTA

50. Two numbers are in the ratio 2:3. 20% of the smaller number added to 20 becomes equal to the sum of 10% of the larger number and 25. Find the smaller number.
    a. 100            b. 120            c. 150            d. CBD

## PROFIT, LOSS AND DISCOUNTS

**DRILL – 1 – LOSS AND GAIN**

Profit / Gain = SP – CP          Gain % = (Gain / CP) x 100
Loss = CP – SP                   Loss % = (Loss / CP) x 100

| Selling Price | Cost Price | Gain | Loss | Gain % | Loss % |
|---|---|---|---|---|---|
| 95 | 125 | | | | |
| | 90 | | | 10% | |
| 65 | | | | | 25% |
| | 112 | 20 | | | |
| 175 | | 50 | | | |
| | 230 | 46 | | | |
| 3450 | | | | 15% | |
| | 1000 | | | | 23% |
| 10400 | | | | | 26% |

**DRILL – 2 – AN ARTICLE SOLD AT TWO DIFFERENT SELLING PRICE**

> **SP 1 / (100 + X) = SP 2 / (100 + Y)**

➢ If Raju sells a pair of glass for Rs. 48, he makes a loss of 20%. At what price should he sell the glasses to make a profit of 15%
   a. Rs. 56          b. Rs. 72          c. Rs. 67          d. Rs. 69

➢ A person sells 36 oranges per rupee and suffers a loss of 4%. Find how many oranges per rupee is to be sold to have gain of 8%
   a) 28          b) 32          c) 62          d) 50

➢ By selling an article for Rs 360, the loss incurred is 10%. At what minimum price should he sell that article to avoid loss?
   (a) 400 Rs          (b) 500 Rs          (c) 600 Rs          (d) 480Rs

➤ Mr. Kapoor incurs a loss of 40% if he sells his goods at Rs. 2040. What should be his selling price to gain 10% on it.
   a. 3700              b. 3740              c. 3730              d. NOTA

➤ If I sell a dozen of toys for Rs. 1080, I get a profit of 10%. What should be my selling price to earn a profit of 21%.
   a. 99                b. 95                c. 96                d. NOTA

## DRILL – 3 – TWO DIFFERENT ARTICLES SOLD AT SAME SELLING PRICE

➤ A man sold two articles for Rs. 4800 each. On one he gains 30% and on other he loses 20%. How much does he gain or lose in the whole transaction?
   a. 0.95% profit      b. 0.95% loss        c. 0.98% profit      d. 0.98% loss

➤ Two products were sold at Rs. 850 each. On one, a gain of 15% is made and on the other, a loss  of 15%. How much % gain or % loss is made in the whole transaction?
   a. 2.5% loss         b. 2.5% gain         c. 2.25% loss        d. 2.25% gain

## DRILL – 4 – USE OF FALSE SCALE

> **100 + G / 100 + x = True scale / False scale**

➤ A dishonest shopkeeper professes to sell goods at his cost price but uses a false weight of 950 grams, for each kilogram. Find his gain percentage.
   a. 6 5/19%           b. 5 5/19%           c. 5 18/19%          d. 5 8/19%

➤ A dishonest shopkeeper professes to sell goods at his cost price but uses a false weight of 900 grams, for each kilogram. Find his gain percentage.
   a. 10%               b. 11.11%            c. 12.5%             d. NOTA

## DRILL 5 - % GAIN OR % LOSS ON WHOLE PROPERTY

| % or part of the whole property being sold (A) | % Gain or % Loss incurred by selling (B) | Product (A x B) |
|---|---|---|
| X th part or x% of whole or quantity x | % gain = g1 % (say) | X x g1 |
| Y th part or y% of whole or quantity y | % loss = l1 % | -y x l1 |
| Remaining z th part or z % of whole or rest quantity of whole | % gain = g2 % | Z x g2 |

% gain or % loss on whole property = Sum of product of quantity and respective gain or loss%

Amount of whole property

- A trader purchased 180 bags of cements at Rs. 900 per bag. He sold 70 bags at 20% profit and 50 bags at 6% loss. At what rate per bag should the remainder be sold so as to gain 9% on the whole transaction?
  
  a. Rs. 963                 b. Rs. 978                 c. Rs. 960                 d. Rs.980

## DRILL – 6 – PERCENTAGE PROFIT = PERCENTAGE LOSS

- The percentage profit earned by selling an article for Rs. 1920 is equal to the percentage loss incurred by selling the same article for Rs. 1280. At what price should the article be sold to make 25% profit?
  
  a. Rs. 2000                b. Rs. 2200                c. Rs. 2400                d. Data Inadequate

- The percentage profit earned by selling an article for Rs 2480 is equal to the percentage loss incurred by selling the same article for Rs 1980. At what price should the article be sold to make 20 % profit?
  
  a. Rs. 2540                b. Rs. 2528                c. Rs. 2675                d. NOTA

## DRILL – 7 – DISCOUNT AND MARKED PRICE

| Cost Price | Marked Price | Selling Price | Discount % | Profit / Loss% |
|---|---|---|---|---|
| | 1800 | 1530 | | 10% profit |
| 2500 | | 3000 | 10% | |
| 3500 | 5600 | | 12% | |

**GOOGLY QUESTIONS**

1. By selling 33 metres of cloth, a person gains the selling price of 11 metres. Find the gain %
   Solution:
   Gain % is
   (11/33) x 100 = 33.33%

2. If a manufacturer gains 10%, the wholesale dealer 15% and the retailer 25%, find the cost of a production of a table, the retail price of which is Rs.1265
   Solution:
   Total gain = 10 + 15 + 25 = 50%
   Gain % = 50%

Sp = 1265
CP = 843.33

3. What is the equivalent discount of the 20%, 10%, 5% discount series
   Solution :
   Equivalent discount is 20 + 10 + 5 = 35%
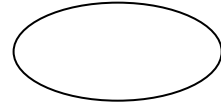
**PRACTICE QUESTIONS**

1. I purchased a pressure cooker @ 9/10th of its selling price and sold it at 8% more than its
   selling price. Find my gain %
   (a) 20%              (b) 25%              (c) 30%              (d) 40%

2. A man sells two flats at the rate of Rs. 1.995 lakhs each. On one he gains 5% and on the
   other, he losses 5%. His gain or loss percent in the whole transaction is
   (a) 0.25% loss       (b) 0.25% gain       (c) 2.5% loss        (d) 25% loss

3. A man sells a book at a profit of 20%. If he had bought it at 20% less and sold if for Rs 18 less,
   he would have gained 25%. Find the cost price of the book?
   a) 45 Rs              b) 200 Rs            c) 90 Rs             d) 250 Rs

4. A shop keeper earns a profit of 12% on selling a book at 10% discount on the printed price.
   The ratio of the CP and the printed price of the book is
   a)45:56               b) 50:61            c)99:125             d) 36:79

5. An article when sold for Rs 200 fetches 25% profit. What could be the percentage profit/loss
   if 6 such articles are sold for Rs 1056?
   a) 10% loss           b) 10% profit       (c) 5% loss          (d)5% profit

6. If the cost price of 15 balls is equal to the selling price of 12 balls, Find the gain percent?
   (a) 50%               (b) 25%              (c) 75%              (d) 30%

7. A man buys 200 oranges for Rs 10. How many oranges for a rupee can he sell so that  his
   profit percentage is 25%?
   (a) 10                (b) 16               (c) 15               (d) 20

8. If selling price is doubled, the profit triples. Find the profit percent.
   a. 66 2/3             b. 100               c. 105 1/3           d. 120

9. In a certain store, the profit is 320% of the cost. If the cost increases by 25% but the selling
   price remains constant, approximately what percentage of the selling price is the profit?
   a. 30%                b. 70%               c. 100%        d. 250%

10. Sam purchased 20 dozens of toys at the rate of Rs. 375 per dozen. He sold each one of them at the rate of Rs. 33. What was his percentage profit?

   a. 3.5              b. 4.5              c. 5.6              d. 6.5

11. On selling 17 balls at Rs. 720, there is a loss equal to the cost price of 5 balls. The cost price of a ball is:

   a. Rs. 45           b. Rs. 50           c. Rs. 55           d. Rs. 60

12. A trader mixes 26 kg of rice at Rs. 20 per kg with 30 kg of rice of other variety at Rs. 36 per kg and sells the mixture at Rs. 30 per kg. His profit percent is:

   a. No profit, No loss    b. 5%           c. 8%              d. 10%

13. A grocer gives only 900 g of cabbage for 1 kg of cabbage by using faulty weighing scale. What is the percentage gain of the grocer in the deal?

   a. 10%              b. 11%              c. 1.01%            d. 12%

14. A jewel box is sold for Rs. 240 for a loss. If it was sold for Rs. 330, the gain amount would have been half of the former loss amount. What was the actual price of the jewel box?

   a. Rs. 260          b. Rs. 280          c. Rs. 275          d. Rs. 300

15. John buys a telephone handset for Rs. 600 from Kolkata and sells it at Ranchi at a gain of 25%. If his overhead expenses are 5% of the cost price, then he sold the telephone handset for

   a) Rs. 800          b) Rs. 780          c) Rs. 750          d) Rs. 720

16. A CD music system when sold at a certain price gives a gain of 20%. If sold for thrice that price, the gain percent will be:

   a) 360              b) 300              c) 200              d) 260

17. A trader had 6 quintals ( 1 quintal = 100 kg) of rice. He sold a part of it at 7% profit and the rest at 17% profit, so that he made a total profit of 11%. How much rice did he sell at 17% profit?

   a) 200 kg           b) 220 kg           c) 240 kg           d) 260 kg

18. The ratio of the cost price and selling price is 3:4. What is the profit percentage?

   a) 25%              b) 30%              c) 33.33%           d) 35%

19. A man buys 2 cycles for a total cost of Rs. 900. By selling one for 4/5$^{th}$ of its cost and other for 5/4$^{th}$ of its cost, he makes a profit of Rs. 90 on the whole transaction. Find the cost of lower priced cycle.

   a. Rs. 360          b. Rs. 250          c. Rs. 300          d. Rs. 420

20. A manufacturer makes a profit of 15% by selling a colour TV for Rs. 5750. If the cost of manufacturing increases by 30% and the price paid by the retailer is increased by 20%, find the profit percentage made by the manufacturer.

a. 6(2/13) %          b. 4(8/13) %          c. 6(1/13) %          d. 7(4/13)%

21. Cheap and Best, a kirana shop bought some apples at 4 per rupee and an equal number at 5 per rupee. He then sold the entire quantity at 9 for 2 rupees. What is the percentage profit or loss?

a. 1.23% loss          b. 6.66% profit          c. 8.888% loss          d. No P/L

22. A shopkeeper buys an article for Rs. 400 and marks it for sale at a price that gives him 80% profit on his cost. He, however, gives a 15% discount on the marked price to his customer. Calculate the actual percentage profit made by the shopkeeper.

a. 62%          b. 64%          c. 53%          d. 54%

23. A trader purchases apples at Rs. 60 per 100. He spends 15% on the transportation. What should be the selling price per 100 to earn a profit of 20%?

a. 72          b. 81.8          c. 82.8          d. 83.8

24. An article costs Rs. 700 to a manufacturer who lists its price at Rs. 800. He sells it to a trader at a discount of 5%. The trader gets a further discount of 5% on his net payment for paying in cash. Calculate the amount that the trader pays to the manufacturer.

a. Rs. 720          b. Rs. 722          c. Rs. 725          d. NOTA

25. Two equal amount of money are lent out at 6% and 5% of simple interests respectively at the same time. The former is recovered 2years early than the later and the amount so recovered in each case is 2880. Find the money lent.

(a)2400          (b)2200          (c)2000          (d)1800

26. If the cost price of 12 pens is equal to the selling price of 8 pens, then the gain percent is

a. 33 1/3 %          b. 60 2/3%          c. 25%          d. 50%

27. Bananas are bought at the rate of 6 for Rs. 5 and sold at the rate of 5 for Rs. 6. Find the profit percentage?

a. 36%          b. 42%          c. 44%          d. 48%

28. M bought two scooters for Rs. 18000. By selling one at a profit of 25% and the other at a loss of 20%, he neither gains nor loses. Find the cost price of each scooter?

a. 8000, 10000          b. 12000, 6000          c. 11000, 7000          d. NOTA

29. By selling an umbrella for Rs. 300, a shopkeeper gains 20%. During a clearance sale, the shopkeeper allows a discount of 10% on the marked price. Find his gain percentage during the sale season?

a. 6%          b. 4%          c. 20%          d. 8%

30. By selling an article for Rs. 240, a man incurs a loss of 10%. At what price should he sell to make a profit of 20%?

a. Rs. 264          b. Rs. 288          c. Rs. 300          d. Rs. 320

31. The cost price of 2 dozen bananas is Rs. 32. After selling 18 bananas at the rate of Rs. 12 per dozen, the shopkeeper reduced the rate as Rs. 4 per dozen. The percentage loss is:
    a. 25.2%          b. 32.4%          c. 36.5%          d. 37.5%

32. A man bought 100 mangoes at a certain price, with the intention of selling each at a profit of 25%. But 20 mangoes got spoiled. If he sold the rest at the intended price, what was his profit or loss percentage?
    a. 0%             b. 6.66% profit   c. 6.25% loss     d. 12.5% profit

33. The cost price of a camera is 90% of its selling price. Find the profit %?
    a. 9 1/11%        b. 10%            c. 11 1/9 %       d. 12%

34. A company manufactures a product for Rs.50. It sold it to a dealer for RS.60 The dealer sold it to a shopkeeper for Rs.75. The shopkeeper sold it to a customer for Rs.100. Find the profit percentage of the company.
    a. 16 2/3 %       b. 25%            c. 20%            d. 33 1/3 %

35. A tempo dealer buys 20 tempos for Rs.3825. Of these, 8 are 4 seaters and the rest are 2-seaters. At what price must he sell the 4-seaters so that if he sells the 2-seaters at 3/4th of this price, he makes a profit of 20% on his outlay?
    a. Rs.180         b. Rs.270         c. Rs.360         d. Rs.450

# QUANTITATIVE APTITUDE - KEY

## NUMBERS

### DRILL 1

| Number | No. Of Factors | Sum of divisors | Product of divisors |
|---|---|---|---|
| 60 | **12** | **168** | **$60^6$** |
| 36 x 36 | **25** | **3751** | **$36^{25}$** |
| 126 x 440 | **120** | **159744** | **$55440^{60}$** |
| 52900 | **27** | **553** | **52900** |

*DRILL 2*

| Numbers | Zeroes | Numbers | Zeroes |
|---|---|---|---|
| 25! | **6** | 100! | **24** |
| 50! | **12** | 200! | **49** |
| 25! + 50! | **6** | 100! + 200! | **24** |
| 25! x 50! | **18** | 100! x 200! | **73** |
|  |  |  |  |
| 136! | **33** | 252! | **60** |
| 140! | **34** | 244! | **58** |
| 136! + 140! | **33** | 252! + 244! | **58** |
| 136! x 140! | **67** | 252! x 244! | **118** |

### DRILL 3

| Expression | Last Digit | Expression | Last Digit |
|---|---|---|---|
| $2^9$ | **2** | $15743^{577}$ | **3** |
| $12^4$ | **6** | $6525^{899}$ | **5** |
| $336^{21}$ | **6** | $(ab......2)^{4n+1}$ | **2** |
| $(ab......3)^{4n+3}$ | **3** | $45^{25} \times 36^{45}$ | **0** |
| $99^{11} \times 11^{99} \times 34^{43}$ | **6** | $100^{21} \times 21^{103}$ | **0** |

### DRILLS

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| DRILL – 4 | **C** | **B** | **A** | **C** | **C** | **D** |  |  |
| DRILL – 5 | **B** | **C** | **C** |  |  |  |  |  |
| DRILL – 6 | **A** | **C** | **D** | **B** | **A** | **B** |  |  |
| DRILL – 7 | **C** | **D** | **A** | **C** | **C** |  |  |  |

| DRILL – 8 | C | A | B | B | C | D | A | B |
|-----------|---|---|---|---|---|---|---|---|

**DRILL 9**

| A | B | HCF (A,B) | LCM (A,B) |
|---|---|-----------|-----------|
| 12 | 9 | 3 | 36 |
| 34 | 50 | 2 | 80 |
| 25 | 40 | 5 | 200 |
| 126 | 60 | 6 | 1260 |
| 7 | 5 | 1 | 35 |
| ¾ | ½ | ¼ | 3/2 |
| 4/7 | 5/7 | 1/7 | 20/7 |
| 1/3 | 1/6 | 1/6 | 1/3 |
| 5/7 | 7/5 | 1/35 | 35 |

**DRILL 10**

| 1 | 2 | 3 |
|---|---|---|
| 40 | 12 | 6621 |

**DRILL 11**

| Base 2 | Base 5 | Base 8 | Base 10 |
|--------|--------|--------|---------|
| **100111** | **124** | **47** | 39 |
| 110101 | **203** | 65 | **53** |
| **111100** | **220** | 74 | **60** |

**PRACTICE PROBLEMS**

| 1 | A | 10 | D | 16 | A | 25 | D | 33 | C | 42 | D |
|---|---|----|---|----|---|----|---|----|---|----|---|
| 2 | D | 11 – 1 | C | 17 | D | 26 | D | 34 | B | 43 | B |
| 3 | B | 11 – 2 | A | 18 | A | 27 | B | 35 | B | 44 | B |
| 4 | D | 11 – 3 | A | 19 | C | 28 | C | 36 | D | 45 | A |
| 5 | A | 11 – 4 | A | 20 | D | 29 | A | 37 | A | 46 | D |
| 6 | B | 12 | A | 21 | C | 30 | D | 38 | B | 47 | C |
| 7 | D | 13 | D | 22 | D | 31 | D | 39 | A | 48 | B |
| 8 | D | 14 | D | 23 | A | 32 | C | 40 | D | 49 | D |
| 9 | A | 15 | B | 24 | C | | | 41 | D | 50 | A |

## AVERAGES AND AGES

*DRILLS*

|          | 1 | 2 | 3 | 4 | 5 | 6 |
|----------|---|---|---|---|---|---|
| DRILL – 1 | B | C | D | A | D |   |
| DRILL – 2 | B | D | B | D | A |   |
| DRILL – 3 | D | A | B | C | B |   |
| DRILL – 4 | C | D | A | B | D |   |
| DRILL – 5 | C | B | D | B | B | B |
| DRILL – 6 | A | D | A | C | D |   |

*PRACTICE QUESTIONS:*

| 1 | B | 9 | C | 17 | D | 25 | A | 33 | D |
|---|---|---|---|----|---|----|---|----|---|
| 2 | A | 10 | C | 18 | C | 26 | B | 34 | B |
| 3 | 20 | 11 | A | 19 | C | 27 | A | 35 | B |
| 4 | A | 12 | B | 20 | C | 28 | C | 36 | A |
| 5 | C | 13 | A | 21 | D | 29 | B | 37 | B |
| 6 | C | 14 | D | 22 | B | 30 | B | 38 | A |
| 7 | B | 15 | B | 23 | B | 31 | A | 39 | B |
| 8 | A | 16 | C | 24 | D | 32 | D | 40 | C |

## RATIOS, MIXTURES AND PARTNERSHIP

*DRILL 1*

| Given | | Find Out |
|---|---|---|
| A:B = 4:5 | B:C = 6:7 | A:C = **24:35** |
| A:B = 6:7 | B:C = 8:9 | A:B:C = **48:56:63** |
| BC:AC:AB = 1:2:3 | | A:B:C = **6:3:2** |
| 1/A : 1/B : 1/C = 2:3:5 | | A:B:C = **15:10:6** |

*DRILLS*

|          | 1 | 2 | 3 | 4 | 5 |
|----------|---|---|---|---|---|
| DRILL – 2 | **18:45:15:25** | 1080 | 8:105 |   |   |
| DRILL – 3 | 36 | 1 | 0.08 |   |   |
| DRILL – 4 | D | B | C | B | A |
| DRILL – 5 | D | C | A | B | D |
| DRILL – 6 | C | B | D | A |   |

| DRILL – 7 | (13/15)$^5$ | C | A | | |
|---|---|---|---|---|---|
| DRILL – 8 | **280,420,140** | C | B | | |

**PRACTICE PROBLEMS**

| 1 | **B** | 11 | **D** | 21 | **B** | 31 | **A** | 41 | **A** |
|---|---|---|---|---|---|---|---|---|---|
| 2 | **C** | 12 | **D** | 22 | **C** | 32 | **B** | 42 | **A** |
| 3 | **B** | 13 | **A** | 23 | **D** | 33 | **A** | 43 | **D** |
| 4 | **D** | 14 | **A** | 24 | **B** | 34 | **B** | 44 | **D** |
| 5 | **C** | 15 | **A** | 25 | **D** | 35 | **C** | 45 | **D** |
| 6 | **C** | 16 | **B** | 26 | **A** | 36 | **D** | 46 | **D** |
| 7 | **B** | 17 | **C** | 27 | **C** | 37 | **C** | 47 | **D** |
| 8 | **C** | 18 | **B** | 28 | **A** | 38 | **D** | 48 | **A** |
| 9 | **D** | 19 | **D** | 29 | **B** | 39 | **A** | 49 | **B** |
| 10 | **D** | 20 | **B** | 30 | **C** | 40 | **D** | 50 | **A** |

**PERCENTAGES, SIMPLE INTEREST AND COMPOUND INTEREST**

*DRILL 1*

| Percentage | Decimal | Fraction |
|---|---|---|
| 1% | 0.01 | 1/100 |
| 10% | **0.1** | 1/20 |
| 20% | 0.2 | **1/5** |
| **25%** | 0.25 | ¼ |
| **50%** | **0.5** | ½ |
| **100%** | 1 | 1 |
| 150% | **1.5** | **3/2** |
| 200% | 2 | **2** |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **25** | **54** | **360** | **2%** | **50%** | **B** | **D** | **B** | **A** | **A** | **B** | **A** |

*DRILLS*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| DRILL – 2 | **B** | **B** | **C** | **B** | **A** | **D** | **B** |
| DRILL – 3 | **C** | **A** | **B** | **B** | | | |
| DRILL – 4 | **C** | **A** | **C** | **A** | **680** | | |
| DRILL – 5 | **A** | **B** | | | | | |
| DRILL – 6 | **C** | **A** | | | | | |
| DRILL – 7 | **C** | **B** | **B** | **B** | | | |

*PRACTICE PROBLEMS*

| 1 | **D** | 11 | **B** | 21 | **C** | 31 | **A** | 41 | **A** |
|----|----|----|----|----|----|----|----|----|----|
| 2 | **B** | 12 | **D** | 22 | **B** | 32 | **D** | 42 | **A** |
| 3 | **A** | 13 | **A** | 23 | **A** | 33 | **A** | 43 | **A** |
| 4 | **D** | 14 | **A** | 24 | **B** | 34 | **D** | 44 | **C** |
| 5 | **C** | 15 | **C** | 25 | **C** | 35 | **A** | 45 | **A** |
| 6 | **A** | 16 | **D** | 26 | **A** | 36 | **B** | 46 | **C** |
| 7 | **C** | 17 | **B** | 27 | **D** | 37 | **A** | 47 | **D** |
| 8 | **C** | 18 | **D** | 28 | **A** | 38 | **D** | 48 | **B** |
| 9 | **A** | 19 | **C** | 29 | **A** | 39 | **C** | 49 | **C** |
| 10 | **A** | 20 | **B** | 30 | **D** | 40 | **D** | 50 | **A** |

**PROFIT , LOSS AND DISCOUNTS**

*DRILL 1*

| Selling Price | Cost Price | Gain | Loss | Gain % | Loss % |
|----|----|----|----|----|----|
| 95 | 125 | - | **30** | - | **24%** |
| **99** | 90 | **9** | - | 10% | - |
| 65 | **86.66** | - | **21.67** | - | 25% |
| **132** | 112 | 20 | - | **17.85%** | - |
| 175 | **125** | 50 | - | **40%** | - |
| **276** | 230 | 46 | - | **20%** | - |
| 3450 | **3000** | **450** | - | 15% | - |
| **770** | 1000 | - | **230** | - | 23% |
| 10400 | **14054** | - | **3654** | - | 26% |

*DRILLS*

|  | 1 | 2 | 3 | 4 | 5 |
|----|----|----|----|----|----|
| DRILL – 2 | **D** | **B** | **A** | **B** | **A** |
| DRILL – 3 | **B** | **C** |  |  |  |
| DRILL – 4 | **B** | **B** |  |  |  |
| DRILL – 5 | **B** |  |  |  |  |
| DRILL – 6 | **A** | **D** |  |  |  |

*DRILL - 7*

| Cost Price | Marked Price | Selling Price | Discount % | Profit / Loss% |
|---|---|---|---|---|
| **1390.9** | 1800 | 1530 | **15%** | 10% profit |
| 2500 | **3333.33** | 3000 | 10% | **20% Profit** |
| 3500 | 5600 | **4928** | 12% | **40.8% Profit** |

*PRACTICE PROBLEMS*

| 1 | **A** | 8 | **B** | 15 | **B** | 22 | **C** | 29 | **D** |
|---|---|---|---|---|---|---|---|---|---|
| 2 | **A** | 9 | **B** | 16 | **D** | 23 | **C** | 30 | **D** |
| 3 | **C** | 10 | **C** | 17 | **C** | 24 | **B** | 31 | **D** |
| 4 | **A** | 11 | **D** | 18 | **C** | 25 | **D** | 32 | **A** |
| 5 | **B** | 12 | **B** | 19 | **C** | 26 | **D** | 33 | **C** |
| 6 | **B** | 13 | **B** | 20 | **A** | 27 | **A** | 34 | **C** |
| 7 | **B** | 14 | **D** | 21 | **A** | 28 | **A** | 35 | **B** |